

Positive Nature Futures for Transformative Change: Visions from Youth in Europe and Central Asia

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Data availability

The data that support the findings of this study are available from the corresponding author, Eriksson, A.E, upon reasonable request.

ABSTRACT

Amid an escalating global crisis for safeguarding nature and its contributions to people, advancing methods to envision and realise transformative change is increasingly urgent. The Nature Futures Framework (NFF) provides a heuristic to co-create visions of positive futures centred on human-nature relationship and diverse values of nature. Despite its potential, the application of the NFF among youth remains limited. To address this gap, visioning was facilitated for young people in Europe and Central Asia during the Regional Youth Workshop on IPBES held in Vilm, Germany. Twenty-five participants (aged 18-30) were introduced to use the NFF and a range of methods – including the *Seeds of Good Anthropocenes*, *Future Wheels*, *Verge* and creative presentations – to co-develop five distinct visions grounded in plural value perspectives on nature. These visions were analysed on their similarities and differences using reflexive thematic analysis and explored for transformative change elements, alongside a pre- and post-visioning sentiment analysis. Our findings indicate that participatory visioning holds strong potential to promote transformative thinking and action towards sustainability. We recommend a wider uptake of the NFF among youth and other relevant actors to embrace diversity and hope, inspire collaboration and action, and contribute to the global vision of living in harmony with nature.

Keywords: biodiversity, future generations, Nature Futures Framework, participatory visioning, Seeds of good Anthropocenes, youth

1 INTRODUCTION

Despite decades of international environmental governance efforts, the degradation of nature and its contributions to people continues at alarming rates. Ecosystems across the planet have been significantly altered by human actions, with around one million species estimated to face extinction in the coming decades if no urgent action is taken (IPBES 2019). Without cohesive societal transformations that respond coherently to the drivers of biodiversity loss in a whole-of-society approach, biodiversity loss will likely worsen in the future (IPBES 2024). Considering the importance of biodiversity in sustaining life on Earth, prompt action is therefore imperative for a future where both people and nature can thrive (CBD 2022).

Beyond direct pressures, such as changes in land and sea use (Keck et al. 2025) and climate change, the biodiversity crisis is closely intertwined with, and deeply rooted in, social and cultural norms and practices (IPBES 2024). In this context, the Transformative Change Assessment of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) emphasises the need for a deep societal shift that addresses not only the direct drivers of change, but also the underlying causes of biodiversity loss (IPBES 2024). While the Convention on Biological Diversity's (CBD) 2050 vision of 'living in harmony with nature' provides a globally agreed aspiration, translating this high-level vision into concrete, locally relevant, and actionable future visions for people and nature remains a gap (Kim et al. 2023, Leadley et al. 2022).

To address this gap, visioning is increasingly recognised as an entry point to initiate and navigate deliberate processes of societal change (IPBES 2024). Visions describe desirable future states of the world and elaborate on long-term ambitions, mobilise collective actions and guide as normative references in scenario development (Bai et al. 2016, IPBES 2024, Lazurko et al. 2023, Pereira et al. 2021). The Nature Futures Framework (NFF) was developed by the IPBES Task Force on Scenarios and Models as a heuristic tool for generating positive narratives and scenarios for nature and people (Rosa et al. 2017; Pereira et al. 2020, IPBES 2025). The NFF places human-nature relationships, diverse worldviews and plural values of nature at its centre, emphasising relational, instrumental and intrinsic values, which can be understood from, e.g., anthropocentric, ecocentric and pluricentric worldviews (IPBES 2022). It is designed to facilitate the co-creation of nature-people positive future visions through inclusive and participatory processes (Pereira et al. 2020). By shifting away from being expert-driven towards engaging diverse actors, the NFF seeks to initiate and create enabling conditions

for transition towards more equitable and sustainable futures (IPBES 2025). In particular, the inclusion of marginalised perspectives, such as young people and people in conflict regions whose voices are underrepresented in decision-making processes, is recognised as an important constituent in transformative change towards equitable and just futures (Gurung et al. 2024, Kim et al. 2026).

The NFF has been applied for diverse purposes across regions and ecosystems (see Okayasu et al. 2025 for synthesis and Carpenter-Urquhart et al. 2026, Durán et al. 2023, Kuiper et al. 2022, Kim et al. 2026 and Lazurko et al. 2025 for examples). However, its application with youth remains limited, with the notable exceptions of the 2019 and 2022 IPBES Youth Workshops described by Rana et al. (2020) and Schmitt et al. (2025), respectively. As the generation that will live through the consequences of the past and current environmental decisions, young people and their youth movements have been at the forefront in recent years demanding more ambitious, just and transformative responses by government and decision-makers to accelerating global environmental crises (O'Brien et al. 2018, Holzscheiter et al. 2025). Yet, despite their political agency and growing public presence, youth perspectives remain marginalised in formal science-policy interfaces on sustainability and biodiversity governance (Grimm et al. 2024, Rouyer et al. 2026). Out of the five recommendations presented by Rouyer et al. (2026) to address this marginalisation (presence, recognition, meaningful engagement, effective implementation and governance reform), we focus here on recognition. Specifically, we explore the development and acknowledgement of visions by young people as legitimate contributions to the environmental discourse. In particular, there is limited empirical evidence on how future design heuristics such as the NFF can be applied in youth visioning processes, what desirable and transformative future visions emerge from such processes, and what lessons and implications these applications offer in fostering youth participation in biodiversity governance for sustainability transformations.

To help address this gap in youth representation, the German Federal Agency for Nature Conservation (BfN), with support from the IPBES Technical Support Unit on Capacity-building, hosted the 'Regional Youth Workshop for Europe and Central Asia' in 2023 to provide an opportunity for young people to learn about IPBES and develop visions for desirable futures. The methodology for this visioning process, presented in detail in a workshop report (Kim et al. 2025), builds on other visioning processes from Pereira et al. (2020), Kuiper et al. (2022), and Kim et al. (2026). In this paper, we describe the visioning process with young people in Europe and Central Asia during the Regional Youth Workshop, and use the outcomes

of this process to elaborate on the futures that can emerge through a participatory visioning process using the NFF and to reflect on the potential of such visioning in engaging and activating youth in sustainability transformation. Specifically, we ask: (1) *What future aspirations and commonalities emerge across youth-generated visions of living in harmony with nature?* (2) *How do these visions challenge the key drivers of biodiversity loss and suggest broader societal transformations to address these drivers?* and (3) *What opportunities and insights does this visioning process and its outcomes provide on the use of participatory visioning for young people in catalysing transformative change?*

2 MATERIALS AND METHODS

The Regional Youth Workshop on IPBES for Europe and Central Asia was convened on 6-10 November 2023 on the Isle of Vilm in Germany, hosted by BfN and gathering 25 young people aged 18-30 years old residing in or being nationals of countries across Europe and Central Asia. The participants were nominated by a government or a regional youth organisation/network, and selected by an independent committee based on their engagement in biodiversity and ecosystem services through research, practice or civil society affiliations (see Supplementary Material 1 for full selection criteria). The visioning process during the workshop was prepared and facilitated by an interdisciplinary group of researchers across continents (Africa: 2, Americas: 4, Asia and the Pacific: 2, Europe and Central Asia: 4) with familiarity with IPBES and experience in scenario development, in particular with the use of the NFF.

The visioning process described in this study was part of a three-day programme, of which the first day was dedicated to getting to know other participants and their organisations alongside an introduction to IPBES and its assessment processes, as well as a guided tour of the island (Kim et al. 2025). The second day and the morning of the third day were dedicated to the visioning exercise. The afternoon of the third day was on exploring next steps with an evaluation and reflection session. The visioning process during this workshop contributed to the increasing number of NFF applications around the world (Okayasu et al. 2025), especially focusing on young people as a key constituent in anticipatory biodiversity governance (e.g. Rana et al. 2020, Schmitt et al. 2025).

2.1 Participatory visioning process

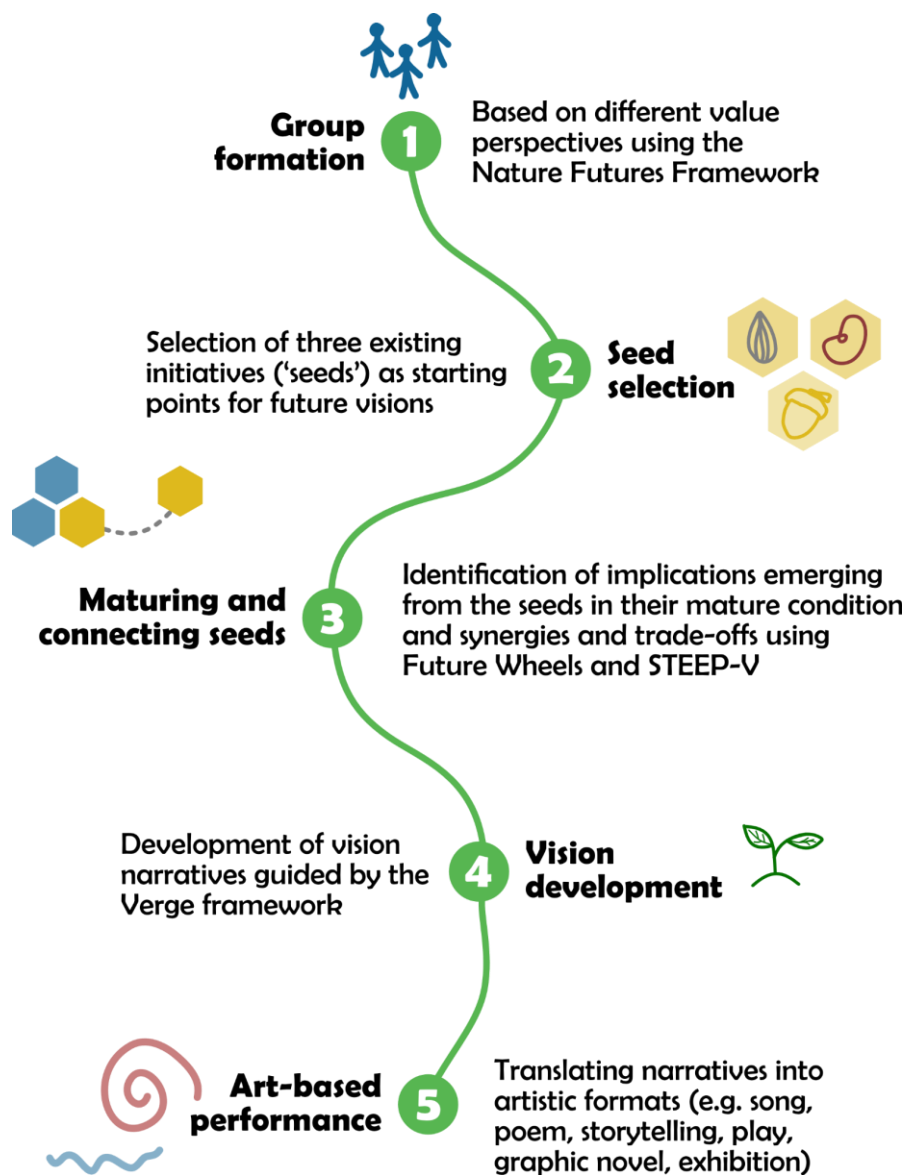
The participatory visioning process was structured around five steps: (1) vision group formation, (2) seed selection, (3) maturing and connecting seeds, (4) vision development, and (5) arts-based performance of visions.

The visioning process focused explicitly on the development of desirable futures, reflecting the original purpose of the Nature Futures Framework (NFF) as a tool for articulating positive futures for nature and people and supporting pathways towards those futures (Pereira et al. 2020; IPBES 2025). To support this process, participants worked with Seeds of Good Anthropocenes (SOGA), defined as existing initiatives, practices, or innovations with potential to contribute to more desirable futures if nurtured and scaled (Bennett et al. 2016). The use of seeds provided a concrete starting point for envisioning transformative futures grounded in present-day developments.

The design of steps 2 to 4 largely drew on the program and methodological approaches described by Kim et al (2026). Participants selected seeds, explored how the seeds might develop and scale up to mainstream, how these seeds may interact and synergise or conflict with one another's developments using the Future Wheels. Then a set of questions were raised through the Verge framework to develop the skeleton narratives and fill the gap. These activities informed the collaborative development of future visions, which were subsequently communicated through arts-based performances.

An overview of the process and associated tools is provided in Figure 1, with each step described in more detail in the following subsections.

Figure 1 | Overview of the participatory visioning process and associated tools.



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2.1.1 Formation of vision groups using the NFF triangle

The first step of the visioning process involved an exercise in a large triangle with each corner representing one of the value perspectives of the NFF: *Nature for Nature* (NN), emphasising the intrinsic value of nature; *Nature for Society* (NS), accentuating the instrumental value of nature and the benefits people gain from nature; and *Nature as Culture* (NC), representing relational values and highlighting the reciprocal relationships between people and nature. The goal was to familiarise participants with the NFF value perspectives by personally and professionally relating to them and identifying spaces and values where participants feel affinity within the triangle.

Participants were asked to think about one personal situation that reflected their connections to nature and then stand in the location within the triangle that they felt best reflected their value perspective in that situation. They could either stand in one of the corners of the triangle or in between two value perspectives with the middle of the triangle being off-limits to ensure participants made a choice. Participants were then asked to share, with people standing next to them, their reason for choosing that location, thus identifying similarities between participants' value perspectives. Then there was a chance to re-evaluate the choice and relocate to somewhere else participants feel affinity to and want to explore as wished. This process was repeated twice more. By the end of this process, five clusters of participants were identified based on their location in the NFF triangle, each cluster thus becoming a vision group for the rest of the visioning process. Each group had 4-6 members and was assigned a facilitator to guide subsequent visioning exercises. The following sections outline the steps taken in each vision group.

2.1.2 Seed selection as a starting point

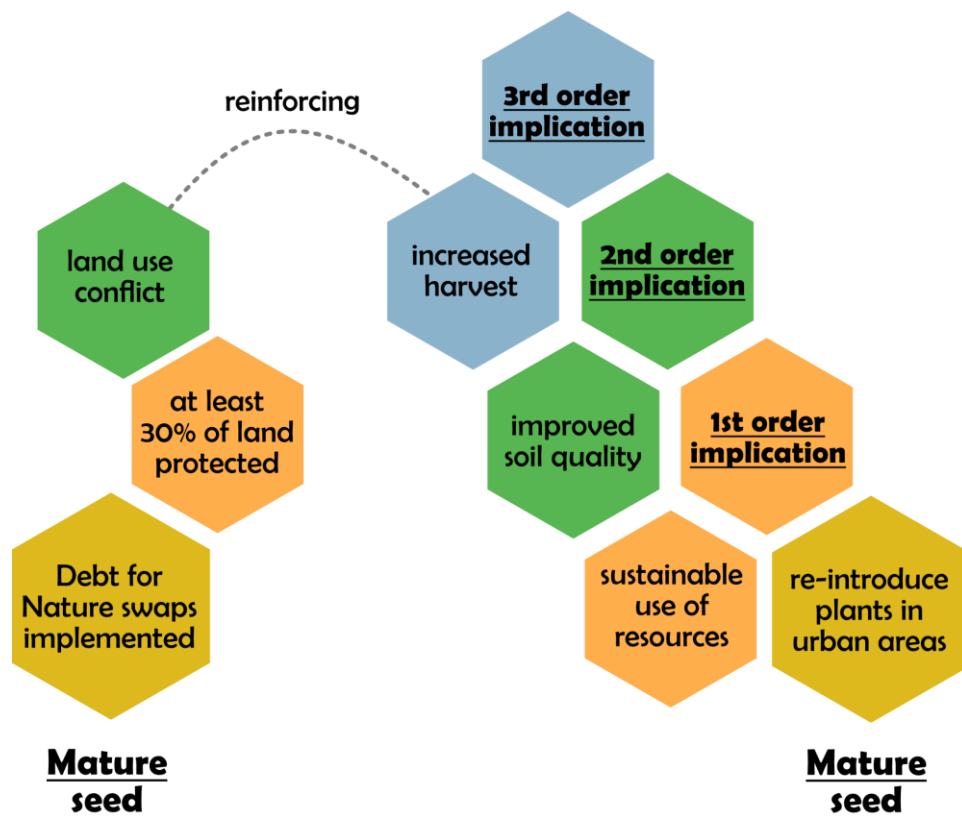
The next exercise was the identification of SOGA to develop the vision. To enable this, seeds had been collected prior to the Regional Youth Workshop from both participants and facilitators. These seeds varied in geographical scope from local to global and relating to different domains (e.g., ecological, economic, technological), on an interactive digital Miro board (shown in Supplementary Material 2). These seeds were mapped onto the NFF triangle according to the value perspectives they reflected. Each group was asked to select three seeds

from the Miro board, corresponding to their position in the NFF triangle. Given the origins and the region of practice by some facilitators and participants, the seeds were not only from Europe and Central Asia, but also from other regions of the world, allowing cross-regional seedling (cross-fertilisation). Participants could rephrase or revise the selected seeds as needed.

2.1.3 Maturing and connecting seeds

The next step involved envisioning the mature condition of each seed selected, i.e. where it has grown into a well-developed and mainstream practice by 2050 (Preiser et al. 2024). Future Wheels, which support the elaboration and visualisation of the consequences of growing and emerging seeds at different scales (Glenn 2009), were used to map first-, second- and higher-order implications of mature seeds. The STEEP-V framework, a systems thinking tool, was additionally used to consider social, technological, economic, environmental, political, and value-related implications. The three mature seeds were each written on a hexagonal sticky note and stuck at the centre of a large piece of paper. After individual brainstorming, common first-order implications across participants were captured on hexagonal sticky notes and stuck directly around the associated mature seed. The same process was repeated for second- and third-order implications (as illustrated in Figure 2).

Figure 2 | An example of two Future Wheels for mature seeds (yellow hexagons). The orange hexagons present the first order implications, the green hexagons the second order, and the blue hexagons third order implications. The line connecting two hexagons indicates reinforcing or conflicting effects between implications.



Once the group's Future Wheels were completed for each of the three seeds individually, the three wheels were compared, focusing on synergies and trade-offs between implications identified for each seed (see Figure 2). A synergy is when the implications are in line with each other, i.e. reinforcing and amplifying each other. A trade-off is when the implications contradict each other, i.e. balancing out, conflicting with, or cancelling each other. For these implications to co-exist in a vision, it is necessary to reconcile them, even if seemingly contradictory. To visualise these interaction effects, participants presented synergies and trade-offs between the implications with a string pinned between the associated hexagons. Identifying synergies and trade-offs was key to ensure that the visions developed using the NFF were consistent and not self-contradictory when combining the seeds into one vision. The discussions around synergies and trade-offs were summarised in writing.

2.1.4 Vision development

Following the Future Wheels exercise, each group developed a skeleton narrative for their vision. This process was guided by the group facilitator, who asked group members to close their eyes and imagine the world in 2050 – a life living in harmony with nature. The facilitator's

guiding questions included what participants saw happening around them, what they could hear and smell, and what the landscape and cities looked like. Participants were then asked to tell their group about the world they imagined. Each group was asked to briefly revisit the NFF triangle to refresh their memories of the intended position and shared values of the group before developing their vision further, in order to account for any blind spots. Potential blind spots included whether values associated with their position in the triangle were well represented by the wheels, and whether any additions or modifications were needed.

Based on the outcomes of this process, which were summarised in writing, draft narratives of the visions were developed. This process was guided by the Verge framework, an ethnographic framework that guided discussions regarding how people define, relate, connect, create, consume, and destroy in envisioned future worlds (Lum and Bowman 2014). The prompts of the Verge framework used in this visioning process can be found in Supplementary Material 3.

2.1.5 Translating visions into artistic expressions

With elaborated narratives of the visions, the final step as a group was to translate visions into creative artistic expression to present to the other groups. This draws upon the increasing application of art-based methods in visioning exercises as means to facilitate imagination of transformative futures and to create a sense of empowerment and hope (Bentz and O'Brien 2019, Bentz 2020). From their vision, each group distilled a storyline with key themes and messages, selected an artistic medium, and prepared their presentation. At the end of the visioning process, five youth visions were presented in the form of performances. The performances included a song with original lyrics, a reading of a graphical novel of a fairy tale, an oral storytelling, a fictive green city tour of future Berlin, and a museum exhibition of objects, songs, poetry and a short movie.

2.2 Post-workshop vision consolidation and data analyses

Following the Regional Youth Workshop, each group refined their vision into a coherent written narrative, which was further refined by the authors based on the materials and outputs generated throughout the visioning process. These consolidated narratives formed the primary material for the thematic and transformation analyses presented in this paper.

Three complementary analytical approaches were employed to support the interpretation of the visioning process outputs and to respond to the research questions. We first identified points of convergence across the visions, then explored how these convergences relate to key elements of transformative change. We examined changes in the participants' emotions about the future before and after the visioning process as an exploratory variable to how the visioning was experienced and extended into further action.

2.2.1 Convergence analysis

Following the Regional Youth Workshop, the outputs were processed and analysed by the authors, comprising a subset of the workshop participants and facilitators.

To identify commonalities across the five visions, we conducted a reflexive thematic analysis (Braun and Clarke 2006) on the narratives. Line-by-line coding of the narrative text was used to identify common themes and key concepts, assisted by a qualitative analysis software ATLAS.ti (ATLAS.ti 2025). Codes were developed from the narrative text and *a priori* knowledge (see Supplementary Material 4 for the coding results).

2.2.2. Transformation analysis

Following the convergence analysis, the common themes were mapped onto the framework of transformative change established in the IPBES Transformative Change Assessment (IPBES 2024). The framework categorises three underlying causes (UCs) of biodiversity loss: a) disconnection from and domination over nature and people, b) concentration of power and wealth, and c) prioritisation of short-term, individual and material gains (IPBES 2024). To address these underlying causes, the framework further defines four guiding principles (GPs) of transformative change: a) equity and justice, b) pluralism and inclusion, c) respectful and reciprocal human-nature relationships, and d) adaptive learning and action (IPBES 2024).

The themes emerging from the convergence analysis examined how the visions challenged or sought to address the underlying causes (UC a-c) and how they reflected the guiding principles (GP a-d). This analysis was used to identify and characterise the transformative elements embedded within the visions and to assess their alignment with the IPBES framework on transformative change.

2.2.3 Sentiment analysis

A Mentimeter survey was conducted immediately before and after the visioning process with the question: ‘What emotion do you feel when you think about the future?’. Participants provided up to three words describing their emotions. Based on these responses, an analysis was conducted to explore potential changes in participants’ emotional responses to the future before and after the visioning process. To facilitate comparison between the pre- and post-visioning responses, the qualitative emotion words provided by participants were mapped onto an ordinal sentiment scale. Each word was assigned to one of five categories (with associated score on the quantitative scale shown in parenthesis): Strongly negative and/or passive (-2); Somewhat negative and/or passive (-1); Neutral (0); Somewhat positive and/or active (1); Strongly positive and/or active (2).

A score was assigned to each response by one author and subsequently reviewed and discussed by the co-authors to enhance consistency and to reduce individual interpretation biases. Mean sentiment scores were then calculated for the pre- and post-visioning responses to provide an indication of changes in the overall emotional state expressed by participants.

Given the subjective nature of assigning sentiment scores to individual words, this analysis needs to be interpreted as an exploratory assessment of group-level state and change rather than a precise measure of individual emotions. The results are therefore presented to indicate the shift in participants’ overarching emotions rather than to draw definitive conclusions about changes in participants’ attitudes, agency, or transformative capacities.

3 RESULTS

In this section, we present five distinct and plural visions that were developed from the visioning process using the NFF and SOGA, as well as the results of the convergence, transformation, and sentiment analyses.

3.1 Vision groups and seeds selection

Out of the five groups and their visions, there are two – Nature for Nature (NN) and Nature for Society (NS) – that align with one of the three value perspectives. The remaining three visions – Nature for Nature-Nature as Culture (NN-NC), Nature for Nature-Nature for Society (NN-NS) and Nature for Society-Nature as Culture (NS-NC) – represent a combination of two value

perspectives. Figure 3 presents the five vision groups and the seeds that they selected, and Figure 4 shows snapshots of their performances and work, along with a workshop participant group photo. In the following, we will summarise the vision narratives, which are given in full in Supplementary Material 5.

Figure 3 | Five vision groups with their selected seeds (bullet points) in the NFF triangle.

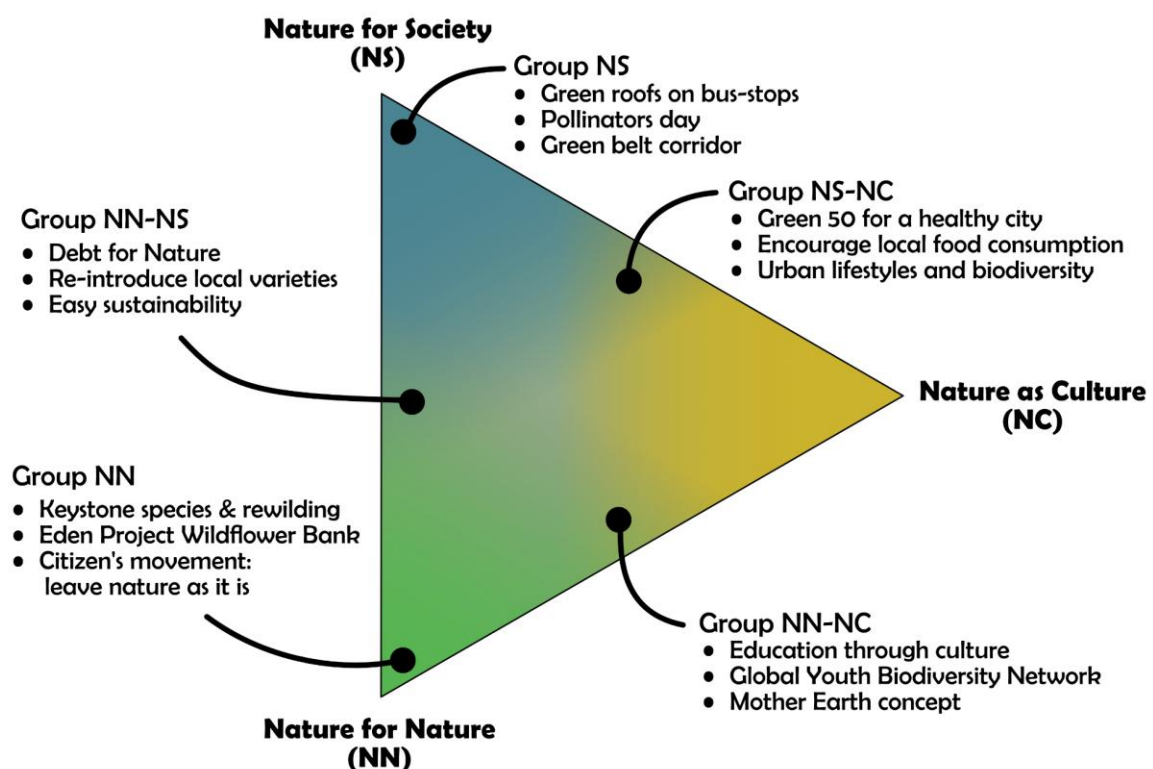


Figure 4 | The figure shows snapshots of creative presentations of each vision group: a) NS song performance, b) NN storytelling, c) NN-NC exhibition, d) NN-NS city tour and e) NS-NC graphic novel reading. The figure also shows: f) a photo of the visioning process exemplified by the NS vision group and g) a group photo of the Regional Youth Workshop participants and facilitators.

(a) NS



(b) NN



(c) NN-NC



(d) NN-NS



(e) NS-NC



(f)



(g)



3.2 Summary of vision narratives

The **NS** vision takes the greening of bus stop roofs, pollinator awareness raising, and a cross-European conservation program as initial seeds. These seeds are envisioned to evolve into the mainstreaming of urban greening, a European and Central Asian platform for pollinator protection, and strengthened green belt initiatives for tourism, education and post-conflict conservation. In the final vision, the future is where nature's contributions to people are valued and the sectors responsible for biodiversity loss, such as agriculture, are restructured to prioritise sustainability. Education, science, innovative technologies and nature-based solutions represent important leverage points in the just and sustainable world in this vision.

The initial seeds of the **NN** vision are rewilding and the reintroduction of keystone species, wildflower banks, and civil society movements for nature protection. These seeds mature into self-sustaining ecosystems with thriving reintroduced species, well-established wildflower banks and advanced justice systems prioritising environmental protection. In the vision, human intervention in nature is minimal with natural processes allowed to run their course. There is an enhanced appreciation for all species for their role in maintaining ecological balance, alongside reduced stress and improved mental health of people, reinforcing a holistic symbiosis between humanity and the environment. Enhanced global collaboration and the expansion of protected areas are important strategies in this future.

The initial seeds of the **NS-NC** vision include a youth-initiated urban greening education and action movement, localised food systems, and social-ecological research on the relationship of urban lifestyles and insect diversity. The group envisioned the future states of the matured seeds as cross-generational education systems emphasising health for people and nature, highly sustainable local food systems, and urban gardens managed for high insect biodiversity. In the vision, nature in cities is not only physically abundant in urban gardens and green infrastructure, but integrated in every aspect of life and valued as integral to local food cultures and (mental) health. Education and transformative learning to shift societal views to recognise human-nature interconnectedness, social-ecological planning and management of urban spaces, and the localisation of food production and consumption are the main leverage points in this future.

The NN-NS vision is developed on initial seeds of debt-for-nature swaps, reintroduction of local species, and a green jobs support tool for youth. In the mature conditions of the seeds, there is a global framework for debt-for-nature swaps regulated by the International Monetary Fund, urban ecosystem services units for managing species reintroduction, and a global platform for green job opportunities. In this vision, mainstreaming of innovative market-based mechanisms and institutional reforms are key leverage points for (re)discovering nature's economic value. This will drive conservation actions in the long term and create new opportunities for economic development, for instance, through eco-tourism and the creation of green jobs in this future.

Lastly, the initial seeds of the NN-NC vision are formal and informal environmental education initiatives, a youth network for biodiversity, and the concept of Mother Earth. The envisioned matured seeds grow into empowerment of biocultural stewardship through education, youth leadership in biodiversity governance, and the reciprocity rooted in local cultures and knowledge. The final vision depicts a future in which reciprocal relationships with Mother Earth are recognised, cherished and celebrated, with people as part. Holistic learning and education systems, which foster practical and green skills and integrate local knowledge as well as biocultural conservation approaches, are highlighted as important building blocks to restore relationships and affinity to nature that are at the roots of this future society.

All five visions presented in this paper are versions of a just and sustainable world of 'living in harmony with nature' (IPBES 2024, CBD 2022). The visions present diverse strategies and approaches to transformative change based on chosen value perspectives of nature and the seeds from around the globe.

3.3 Convergence analysis: common features across the visions for a just and sustainable world

Nature: Appreciated and Abundant

All five visions present a future where nature is abundant and valued, and where diverse species and ecosystems thrive and coexist with humans, including in urban areas. In these imagined futures, nature holds a central place in society. It is no longer considered external to human systems but embedded within education, governance, economy, and cultural expression. This

revaluation is reflected not only in material terms (e.g., biodiversity restoration and urban greening) but also in symbolic and caregiving means (e.g. emotional connection and empathy).

Reconnecting: From Domination to Harmony

Across the visions, a shared aspiration emerges to overcome human impacts on, disconnections from and domination over nature, which underlie biodiversity loss, and to reimagine the human–nature relationship as one of reciprocity and respect. The visions depict futures characterised by peace, connection and harmony – at all levels of society. A deeper connection between people and nature is highlighted and is operationalised through mechanisms such as education, art, place-based conservation, sustainable land use, and inclusive urban design, which facilitate affective and embodied connections to the natural world. In these futures, harmony is extended to all levels of society, where interpersonal and global conflicts are ‘calmly resolved through dialogue and intelligence’. The prioritisation of peace, harmony, and co-existence — both socially and ecologically — indicates a paradigmatic shift from anthropocentrism and separation towards a more cohesive and relational world.

Governance: Decentralised, Inclusive, and Equitable

The visions propose structural changes in governance aimed at countering the concentration of power and decision-making. While global processes and institutions are highlighted in some visions, a majority of visions emphasise a shift towards decentralised and participatory governance models, where decision-making authority is distributed across local communities, and governance processes are informed by a plurality of knowledge, including Indigenous and local knowledge. This pluralistic approach is anticipated to strengthen social cohesion and to foster environmental stewardship, responding to the needs of both people and nature. Moreover, the visions underscore the importance of social justice and equity, through protection of minority rights, universal basic income, inclusive legal frameworks and other proposals for intra- and intergenerational justice. These interventions directly progress towards addressing the underlying structural inequalities and value hierarchies that contribute to unsustainable trajectories.

Economy: Localised, Sufficient, and Regenerative

Economic transformation emerges as a critical component across all visions, with a marked departure from extractive and growth-oriented paradigms. The envisioned futures promote localised, circular, and regenerative economies that prioritise the well-being of people and nature over economic growth and ecological integrity over short-term economic gains. Strategies such as local food production, community-based manufacturing, ecological taxation mechanisms, and the re-valorisation of traditional knowledge suggest a deliberate effort to internalise environmental externalities and redistribute economic power. All visions depict changes in two major sectors: agriculture and technology. The visions see agriculture to be more sustainable and respectful of nature – regenerative, local and seasonal – boosted by urban farming and supported by technology. Technology is reconfigured as an enabler of sustainability rather than a driver of consumption, particularly in its applications for ecosystem restoration, resource efficiency, and climate resilience. These shifts reflect both a practical and normative repositioning of economic and technological systems in line with the broader objective of societal transformation.

3.4 Transformative elements of the visions

The visions reflect both underlying causes (UCs) and guiding principles (GPs) from the framework presented in the Transformative Change assessment of IPBES (IPBES TCA; IPBES 2024). Disconnection from and domination over nature and people (UC a) is overcome by respectful and reciprocal human–nature relationships (GP c) in the themes ‘Nature: Appreciated and Abundant’ and ‘Reconnecting: From Domination to Harmony’. Concentrations of power and wealth (UC b) are replaced by pluralism and inclusion (GP b) in the themes ‘Governance: Decentralised, Inclusive, and Equitable’ and ‘Economy: Localised, Sufficient, and Regenerative’. Finally, the visions break from the past prioritisation of short-term, individualised, and material gains (UC c) through ‘Governance: Decentralised, Inclusive, and Equitable’ and ‘Economy: Localised, Sufficient, and Regenerative’ guided by equity and justice (GP a). While adaptive learning (GP d) was not explicit in visions, it would potentially emerge in pathways towards these end states. The presence and alignment with UCs and GPs of the IPBES TCA across the five youth visions of the ECA region suggests that the visions have transformative characteristics.

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3.5 Sentiment analysis pre- and post-visioning

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The sentiment analysis of the Mentimeter survey responses (see Figure 5 and Table 1 for responses and scores for each response, respectively) indicates a clear shift in participants' emotions and attitudes towards the future before and after the visioning process. Prior to the visioning process, responses clustered more strongly around negative or passive terms, including words such as *anxious*, *chaos*, *fear*, and *hopeless*, resulting in an overall mean score of -0.37. After the visioning process, however, the distribution of responses shifted towards more positive and active terms, with frequent mentions of *hope*, *optimism*, *empowerment*, and *community*. This resulted in an overall mean score of 1.21, reflecting a transition from weakly negative/passive emotions to moderately positive/active ones.

Figure 5 | Word cloud from the Mentimeter survey before (a) and after (b) the visioning process, showing words and emojis responding to the question: 'What emotion do you feel when you think about the future?'

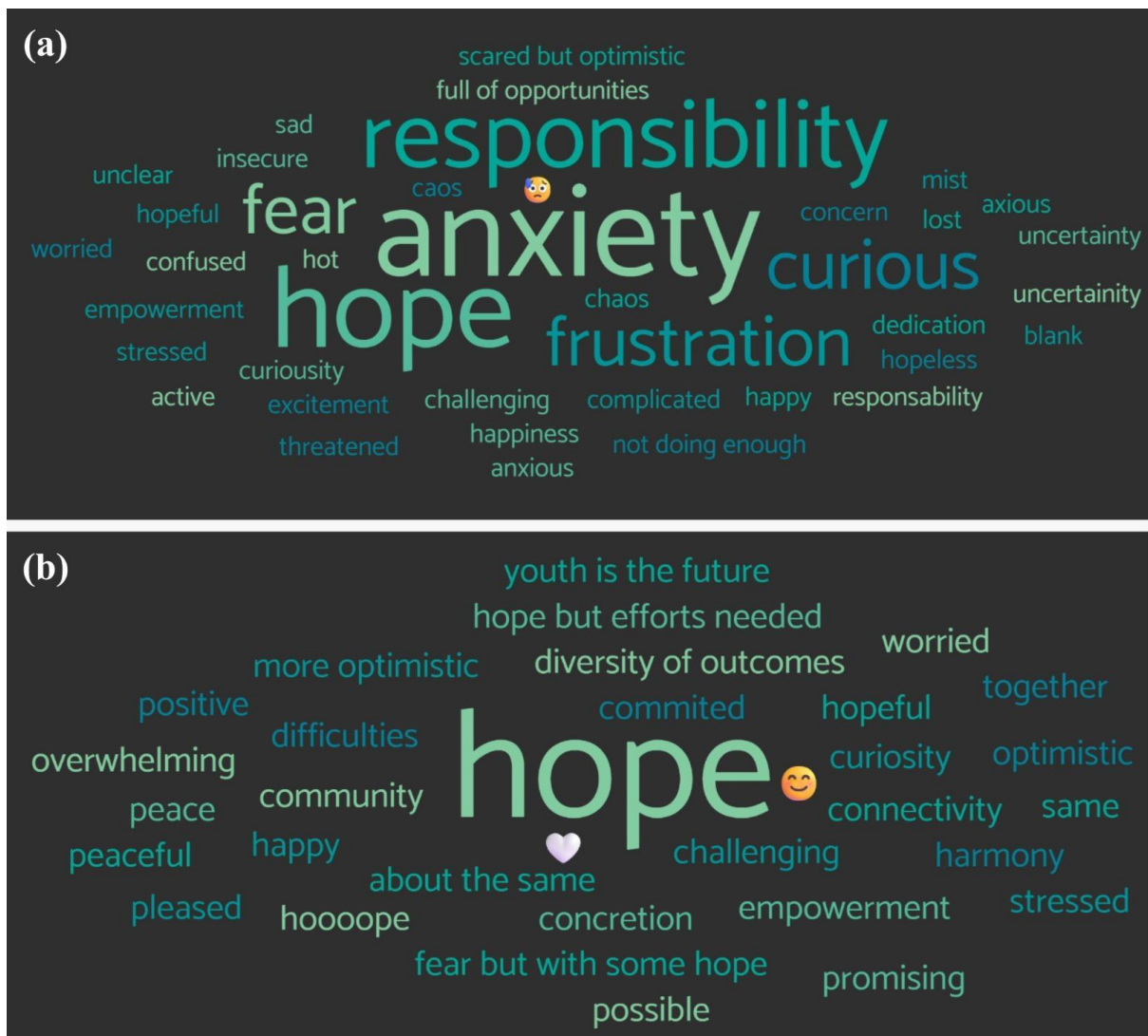


Table 1 | Word cloud responses of participants pre- and post-visioning scored numerically according to five criteria.

Emotion classification	Score	Word cloud responses
Strongly negative and/or passive	-2	Anxious, Anxiety, Chaos, Fear, Hopeless, Hot, Lost, Sad, Threatened
Somewhat negative and/or passive	-1	Challenging, Complicated, Concern, Fear but with some hope, Frustration, Mist, Not doing enough, Overwhelming, Stressed, Uncertainty, Unclear, Worried
Neutral	0	Responsibility, Scared but optimistic

Emotion classification	Score	Word cloud responses
Somewhat positive and/or active	+1	Committed, Curiosity, Curious, Dedication, Hope but efforts needed, More optimistic, Optimistic, Possible, Together
Strongly Positive and/or active	+2	Active, Community, Concretion, Connectivity, Diversity of outcomes, Empowerment, Excitement, Full of opportunities, Happy, Harmony, Hope, Hopeful, Peace, Peaceful, Pleased, Positive, Promising, Youth is the future

4 DISCUSSION

In the sections that follow, we discuss the content of the visions and their implications for future use of the NFF by and with young people and other groups. In 4.1, we focus on the future aspirations and commonalities emerging across the youth-generated visions of living in harmony with nature (4.1), addressing RQ1. In 4.2, we examine how these visions challenge key drivers of biodiversity loss and point towards broader societal transformations (4.2), addressing RQ2. The subsequent sections (4.3–4.5) collectively address RQ3 by reflecting on the opportunities and insights arising from the visioning process and its outcomes. We draw conclusions for future use of participatory visioning with young people, drawing upon transformative participant experiences (4.3), methodological considerations (4.4), and pathways from visioning towards action (4.5).

4.1 Youth visions of desirable futures for nature and people

Our findings show that, despite their different starting points and emphases, both in terms of their respective location in the NFF triangle and the seeds they emerged from, the five visions converged around a shared aspiration for futures with intertwined ecological, social, cultural, economic, and institutional transformations. Across the visions, nature was not framed as a sector to be protected in isolation, but as a foundational element of human well-being, governance, education, and economic activity. Recurring themes included abundant and valued nature, reciprocal human–nature relationships, inclusive and decentralised governance, and localised and regenerative economies. Together, these findings suggest that participants

envisioned desirable futures not as incremental improvements to existing systems, but as futures characterised by fundamental changes in how societies relate to nature, organise collective decision making, and define prosperity.

The visions presented share commonalities with and differences from previously published youth visions using the NFF. The visions developed in the IPBES Youth Workshop in 2019 (Rana et al. 2020) emphasise nature as inseparable from broader social and economic transformations, which align with the themes ‘Nature: Appreciated and Abundant’ and ‘Economy: Localised, Sufficient, and Regenerative’ in the visions of youth in the ECA region presented in this paper. Similarly, the pathways developed in the IPBES Youth Workshop in 2023 by Schmitt et al. (2025) explicitly span multiple value perspectives (intrinsic, instrumental, relational and combinations thereof), however with notable differences. While the visioning process in Rana et al. (2020) was structured around ‘seeds’ as leverage points, the visioning process in Schmitt et al. (2025) encouraged open exploration of pathways to the global NFF visions as predetermined future states. Therefore, the visions presented in this paper are the first documented visions for 2050 developed by young people in the ECA region facilitated using the NFF. These similarities and differences highlight that the visioning process described in this paper works for the youth population in developing diverse visions and is therefore encouraged in other regional contexts. The visioning was built on prior applications with novel advancements in methods by the participants, building capacity for futuring.

Crucially, the NFF offers a structured approach for making visible and articulating diverse perspectives while maintaining a shared orientation towards positive futures. By organising the visioning around different (combinations of) value perspectives, it creates space for participants to explore different conceptions of desirable human–nature relationships without requiring these conceptions to be reconciled into a single vision. Nevertheless, dialogue across groups makes commonalities and differences visible. Integrating youth-led visioning can consequently broaden whose perspectives and values are represented in environmental futures discourse, and potential subsequent implications for environmental governance. The complementarity of visions from successive IPBES-related youth workshops illustrates that youth perspectives cannot be reduced to a single homogeneous vision; rather, different youth groups contributed distinct visions while identifying shared aspirations. Such plurality enriches environmental futures discourse by making diverse values, aspirations, and possible transformations visible. As per the recommendation of Rouyer et al. (2026) for recognition of

young people's ideas and visions, such diverse conceptions of positive futures by youth could inform environmental science-policy interfaces, not least through IPBES.

4.2 Transformative elements embedded in the visions

The visions suggest that young people see a need to address biodiversity loss not as an isolated environmental problem, but through wider changes in governance, economic systems, social relations, and societal values. In line with this, the visions collectively addressed all three underlying causes of biodiversity loss identified by IPBES (2024). Disconnection from and domination over nature and people was challenged through visions of reciprocity, stewardship and harmonious human–nature relationships. Concentrations of power and wealth were addressed through calls for more decentralised, inclusive, and participatory forms of governance and economic models that redistribute benefits and responsibilities more equitably. Likewise, the prioritisation of short-term and material gains was countered by long-term perspectives centred on ecological integrity, collective well-being, and intergenerational justice.

The guiding principles of equity and justice, pluralism and inclusion, and respectful and reciprocal human–nature relationships were strongly represented across the visions. The principle of adaptive learning and action was less explicit in the visions, which is expected since it is dynamic in principle (i.e. having an influence over time), whereas the visions are static (i.e. given at a single point of time). Therefore, the fact that adaptive learning and action was not explicit in the visions does not necessarily mean it would not be present in the pathways leading to those visions. Together, these findings suggest that transformative change was embedded in the visions. By connecting desirable future imaginaries to the underlying causes of biodiversity loss and the guiding principles for transformative change, the visions offer a youth-informed perspective on potential pathways towards living in harmony with nature.

4.3 Applying the NFF in youth-led visioning processes

This study provides insights into how participatory NFF-based visioning can engage young people in imagining desirable and transformative futures and potentially influence their orientation towards these futures. The sentiment analysis described in Section 3.4 suggests that when the visioning process concluded, participants had a more positive and proactive outlook

on the future. The post-visioning reflection indicated that participants had both motivation to contribute to positive change and perceived agency of their ability to do so. Thus, the visioning process not only facilitated more hopeful and actionable visions but also highlighted a potential for overcoming negativity through co-creation.

Although we did not measure the processes underlying these changes, our experience from the participatory process (Fig 1) and subsequent steps suggests several theoretical perspectives that may help interpret them. The participatory and dialogical nature of the NFF resonates with the concept of prospecting, the mental representation and evaluation of possible futures, which supports motivation, planning, and adaptive behaviour (Seligman et al. 2013). Similarly, it aligns with the transformative learning theory, whereby critical reflection and dialogue can help shift perspectives and worldviews (Taylor 2007, Kitchenham 2012). The process may also be understood as a form of futures-literacy practice, creating opportunities for participants to develop their capacity to imagine, discuss and engage with alternative futures (Horst and Gladwin 2024), even being empowered (see 4.5). The shift towards a more positive and proactive attitude towards the future of nature and people aligns well with the originating principle of SOGA by Bennett et al. (2016). The seeds were introduced as a way to build on and amplify existing initiatives, intentionally transitioning away from negative consequences in the future (Bennett et al. 2016). As such, SOGA can function not only as a source of content for future visions, but also as a mechanism for shifting participants' attention towards solutions and the agency to pursue them (Bennett et al. 2016, IPBES 2024).

However, our findings should be interpreted cautiously. The methodology used to map and quantify responses as scores was introduced to indicate shifts in participants' perceived hope and agency, rather than to draw definitive conclusions about the extent to which it has shifted and about the perceptions of individual participants. In addition, the small sample size (25 participants) and the momentaneous capture of participant sentiments at the end of the visioning process are not sufficient to draw conclusions about whether this effect would be seen in other comparable populations and whether the shift in sentiment will continue to inspire hope and action after the visioning process. Organisers of future workshops with visioning processes could follow up with participants, e.g. 6-12 months after their workshop, to assess changes in participants' sentiment and actions. Nevertheless, the development of this paper and several other initiatives taken by participants, inspired by the Regional Youth Workshop (see 4.5), suggest that the hope and agency experienced during the visioning process were sustained to motivate actions for catalysing broader transformation.

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664 4.4 Methodological considerations and limitations

665 The participants of the visioning process, by design, were actively engaged and well-educated
666 in environmental research or practice, with demonstrated leadership in their respective
667 communities. Therefore, the visions, sentiments and other visioning process outcomes
668 presented in this paper need to be interpreted as illustrative rather than representative of young
669 people in ECA. Although the composition of workshop participants was not representative of
670 the youth population in the ECA region, the vision development provided a meaningful
671 experience for participants to contribute their perspectives and to test new methodology.

672 The visioning process began by eliciting participants' value perspectives on nature, which were
673 subsequently clustered into vision groups to select and grow seeds in the chosen value context.
674 This vision clustering helped to avoid potential conflicts between strongly diverging values for
675 a time-efficient process. The overall composition of workshop participants supported this
676 methodological choice, as the majority of participants were already engaged in biodiversity
677 conservation as early career researchers or practitioners. This suggests that having shared
678 values and mutual understanding from the entry point likely shaped the resulting visions. The
679 discussion dynamics and methodological suitability would likely differ in groups with more
680 heterogeneous backgrounds or with limited prior engagement on environmental issues.
681 Additionally, the visions represent the perspectives of an unevenly distributed sample of young
682 people in ECA. Central Asia was represented by only one participant from Kazakhstan (despite
683 efforts to invite more young people in Central Asia for the workshop), which means that the
684 visions are more strongly shaped by the perspectives of the European part of the region. At the
685 same time, more than half of the visioning facilitators originated from other regions than ECA,
686 and the visioning process used seeds collected from all continents, which enriched the visions
687 to be more regionally inclusive (Kim et al. 2025). More explicitly, the externalised impacts of
688 ECA on other parts of the world (e.g. telecoupling), economic transformation required for
689 sustainability, migration and other aspects of global justice and equity were introduced in the
690 scene setting and discussed to varying degrees across vision groups during the visioning
691 process to make the visions globally compatible (Kim et al. 2025).

692 Future applications of the NFF could consider more representative sample groups and a greater
693 heterogeneity in value perspectives. This could be achieved by having value heterogeneity in
694 the group composition from the start. Another possibility is the cross-pollination of seeds

between the vision groups or having all vision groups consider all three value dimensions of the NFF regardless of their preferred value perspectives at the beginning. Combining seeds would also align with the original conceptualisation of SOGA (Bennett et al. 2016). If sufficient time can be allocated during a visioning process, conflicting seeds can be brought together to explore tensions and synergies through facilitated dialogue (Luederitz et al. 2016). Doing so can be especially useful in contexts where participants do not have shared values of, for instance, nature conservation and equity. Benefits of such value pluralism include a higher degree of learning from other perspectives and enhanced realism.

With appropriate contextual modifications, the visioning process described in this paper could be applied in other contexts with other marginalised or underrepresented groups than young people, for example Indigenous Peoples, women or disabled people. Such applications could leverage a diversity of methods in combination with the NFF, including art-based methods, as explored in greater depth by Okayasu et al. (2025) than in this paper, which focuses on the specific visioning process during the Regional Youth Workshop. Comparing the visions developed across different groups could provide invaluable insights into how the NFF can work in diverse contexts and be used as a tool for empowering voices otherwise structurally dismissed. If an empowerment effect is observed in these marginalised groups, the methodology described in this paper could play a role in enhancing equity in the process of transformative change (Pereira et al. 2020; Kim et al. 2026).

As with any academic paper that presents the consolidated views of its authors, a range of biases can arise: confirmation bias, as the tendency to favor information that confirms one's existent beliefs (Nickerson 1998); framing, the way individual actors present and construct evidence (Tversky and Kahneman 1981); self-serving bias, accrediting accomplishment to one's own capacities but failure to outside factors (Mezulis et al. 2004); observer expectancy effect, the subconscious influence a researcher's expectations impose on the research (Rosenthal 1966); and the 'IKEA effect', attributing a higher value to something one did by oneself (Norton et al. 2011). Whilst general to scientific production, these biases need to be accounted for in future applications of the NFF, given its anticipated role to bring diverse perspectives beyond science in policy and practice.

4.5 From visioning to action: implications and future directions

To further characterise the visions and to identify potential clusters and gaps, the NFF can be used with other futures archetypes in the literature, such as Dator's (2009) "continuation", "collapse", "discipline" and "transformation". The NFF pathways from the present day to the future state may include phases of one or more of Dator's archetypes, illustrating how the world evolves over time. For instance, the present day may continue for a period of time until the system collapses, requiring a transitional period of discipline before transformation takes place (which could lead to one of the futures envisioned in this paper).

The elaboration of pathways can also consider undesirable drivers (e.g. organised crime, corruption, conflict and authoritarian backlash) more explicitly in identifying aspects of systems to dampen and or amplify to achieve the envisioned futures. Such exploration can make the NFF research more constructive and robust as input for environmental policy and practice given existing tensions in development-driven societal contexts.

While the visioning process focused on desirable futures, translating visions into transformation requires institutions, networks, and collective action. To build upon the optimism and the empowerment from this visioning process, participants discussed forming a youth network on positive futures for nature and people and further disseminating visioning to their networks. Such a network would bring together existing youth-led environmental and other initiatives as a platform for collaboration, learning and activities informed by joint visioning of positive futures for nature and people. It would amplify existing initiatives and avoid duplication of efforts within the youth movement. A good illustrative result of this discussion was realised through co-developing and jointly authoring this paper with continued engagement and co-learning of the NFF as well as futures thinking after the workshop.

Furthermore, workshop participants have also started to demonstrate the practical potential of the NFF in their respective communities. In 2024 and 2025, three participants of the Regional Youth Workshop independently designed and implemented NFF-based visioning projects, each engaging youth in developing visions of positive futures for nature and people and fostering their integration into local action strategies.

One participant, from Sweden, developed a workshop concept called "The Future We Want – Envisioning Harmony with Nature" using a shortened and adapted version of the visioning process described in this paper (Eriksson 2025). Variations of this session were held at three separate youth climate conferences: the Regional Conference of Youth in Vienna (May 2024),

the Nordic Youth Climate Summit in Copenhagen (March 2025) and the Nordic Youth and Children Climate Conference in Stockholm (September 2025), involving 20-30 participants in each. Their durations were 60-90 minutes and started similarly to the Regional Youth Workshop with an introduction to biodiversity and its ongoing decline, followed by group formation using the NFF triangle. It differed from the visioning process in the Regional Youth Workshop by having one seed pre-selected by the facilitator for each value perspective and each group developing one Future Wheel, around their corresponding seed. Thus, it was possible to arrive at roughly defined visions within the time available for the workshop and to discuss these between the groups, using the Future Wheels as a basis.

Another participant, from Armenia and through their affiliated nonprofit organisation, Evergreens NGO, implemented the Conservation Lab, which applied the NFF as a guiding framework for envisioning and operationalising positive futures for nature and people. This project was funded by the European Youth Foundation of the Council of Europe and conducted between September 30 and October 5, 2024. The Lab engaged 20 young participants aged 16 to 25 across Armenia with a particular focus on climate-vulnerable regions. The first phase of the Conservation Lab emphasised capacity building through sessions on the state of climate crisis, biodiversity and ecosystem services, renewables and fossil fuels, sustainable consumption, environmental economics, and climate and gender. The second phase, much like the visioning process during the Regional Youth Workshop, integrated NFF and other complementary tools such as SOGA, Future Wheels, and Verge to facilitate the creation of five positive nature futures visions. Three of these visions were translated into funded 'local action' initiatives, allowing the implementation of the visions in small steps (Arakelyan 2024).

A third participant, from the Netherlands, applied NFF tools through a workshop led by Pollinator Ambassadors, an Austrian non-profit association. The NFF visioning and the NFF triangle focusing on human-nature relationships were applied in an Erasmus+ funded workshop titled 'FLOWER: Facilitating Learning and Women's Empowerment in Pollinator Regeneration', held in November 2024. The workshop consisted of 20 participants, women aged 18 to 30, who were residents or nationals of Austria or Greece. Participants explored the topic of pollinator decline using systems thinking tools, and created visions for a future with thriving pollinators, which were then communicated through zines and exhibited in an outdoor setting. The zines produced were also exhibited in the University of Cambridge Museum of Zoology for its 2025 Women's Day exhibition. An online exhibition followed on the websites

of the Museum and Pollinator Ambassadors with tools used in the workshop published as a zine (Blömer and Schuller 2025).

This suggests that the principles and the methodologies used in the visioning process of this study were further replicated, with participants catalysing the use of NFF by integrating their learnings from the Regional Youth Workshop into their respective research and practice, in diverse and creative contexts.

5 Conclusion

This study demonstrates the value of participatory youth visioning for articulating desirable and transformative futures. Our findings highlight how young people's collective imagination, grounded in the Nature Futures Framework, can generate innovative and contextually relevant visions for living in harmony with nature by 2050. Across diverse value perspectives, youth visions converge around 'abundant and valued nature', 'reciprocal human–nature relationships', 'inclusive governance', and 'regenerative economies'. These shared themes suggest that young people envision living in harmony with nature not as ecological restoration alone, but as a broader societal transformation. These visions align with the guiding principles of transformative change to address the underlying causes of biodiversity loss, as outlined by the IPBES Transformative Change Assessment (2024). Rather than focusing on incremental environmental improvements, the visions emphasise changes in the ways societies govern, learn, produce, and relate to nature. Beyond the content of the visions, the process of generating them is serving as an important catalyst for continued engagement and action, with participants already applying and disseminating the learning in their own communities and contexts. These findings suggest that youth visioning can contribute not only to pluralising environmental futures, but also to developing the capacities of young people to participate in shaping them. Future work can expand on participatory visioning, build networks for sustained collaboration and action, and further explore how youth-led visioning can inform and strengthen decision-making processes. In doing so, youth visions will become a vital force in shaping inclusive, resilient, and transformative futures for people and nature.

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Supplementary Material

SM.1 Criteria for participant selection

Successful candidates were required to:

- Be between 18-30 years of age
- Be a national from one of the following countries (Reflecting the scope of the IPBES regional assessment for Europe and Central Asia):
 - Western European countries: Andorra, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Liechtenstein, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland and United Kingdom of Great Britain and Northern Ireland
 - Central European countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia, North Macedonia and Turkey
 - Eastern Europe: Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova, Russian Federation and Ukraine
 - Central Asia: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan
- Be actively engaged in work on biodiversity, ecosystem services and nature conservation (including climate change issues or transformative change processes)
- Be nominated by a Government or an organisation/network via a nomination form
- Be committed to participate in person in the youth workshop. Participants are expected to actively contribute to the workshop and to report on its outcome and on the work of IPBES to their home institutions and other relevant organisations and networks
- Have very good speaking, reading and writing skills in English as the workshop will be held in English
- Have demonstrated the ability to respectfully interact with people from other disciplines and work effectively and efficiently in a multicultural team.

These criteria can also be found at the workshop call by the BfN:

<https://www.bfn.de/en/events-ina/regional-youth-workshop-ipbes-europe-and-central-asia-2023>

SM.2 Seeds for participants to select from

ECA Youth Nature Futures Visioning

Seeds of Good Anthropocene

Seeds are concrete positive and inspiring initiatives that hold potential to shape a more just, prosperous and sustainable future. They can be innovative (social, technological, economic) or social-ecological ways of thinking or doing that exist, at least in prototype form, and that represent a diversity of worldviews, values, and regions, but are not currently dominant or prominent in the world ([Bennett et al., 2019](#))

How to contribute

Please write one or more of seeds that you find from your local region or nation, region/Europe and Central Asia, and the globe that you would like to see maturing/evolving in the future. Please consider diverse values of nature for their needs; intrinsic values allowing nature to thrive as it sees fit (e.g. safety), utilitarian values on diverse benefits humans receive from nature (e.g. clean air and water); and relational values where we co-create meanings with nature (e.g. favorite insect from childhood).

Examples could be:

- Use of biodegradable reusable instead of plastic bottles and disposables at coffee shops and meetings
- Sanctuaries - places that rescue and socially feral farmed and captive animals to live them and to care for them.
- Citizen Science - citizens observing nature outdoors and collecting and analyzing data with smart technology

We will develop the vision for the Future of Europe and Central Asia based on these seeds, imagining the regions where these small initiatives become common practices and see their impact across societies and the globe.

Local or National in ECA

Regional/ECA

Global

The figure displays three columns of seed cards under the headers "Local or National in ECA", "Regional/ECA", and "Global". The first column contains pink cards, while the other two contain blue and green cards respectively. Each card has a title and several lines of placeholder text. A red circle highlights one specific seed card in the Global section.

Facilitator's board - anywhere around the globe

1013 **SM.3 Verge table**

1014

1015 Table SM.1 | Verge table used in the visioning process during the Regional Youth Workshop.

Topics	Variety examples	Questions
Define	Worldviews, paradigms, social values and attitudes	• What do people value? • Human rights? • Is there a focus on the individual or the collective/community? • How do people spend their time? • How are intergenerational relationships viewed? The elderly? The young?
Relate	Family structures, business models, governance structures	• Who is governing? Who makes decisions? • How do governance processes work? • How are communities defined? What ties them together? • Who has a voice? Who doesn't? How are these voices expressed and heard? • How equal is society? What inequalities are there? (gender, poverty...) • How do people relate to nature? Are the relations between humans and nature organised/institutionalised? How? • How do people move? How much do people move?
Connect	Information technology, urban design, language	• How connected are people to each other? And how do they connect? • Are people connected to nature? How do they connect? • What do cities look like? • How are people distributed (urban – rural)?
Create	Manufacturing, efficiency, rule-making	• What do jobs look like? • How do people engage with the infrastructure and artefacts around them? • What is the role of nature in products and the built environment? • What is the role of technology? (health, infrastructure, agriculture, water...) E.g. using innovative farming technologies (some sort of green houses) to enable different cultural foods to be produced locally • What are people building?
Consume	Modes of exchange, consumer preferences, marketing	• Where does energy come from? • Who controls the market? • What does 'development' mean? • What does the Economy look like? • Where do people get their food? How is it grown?
Destroy	Violence, waste, attempts to undermine rules and norms	• What is destroyed? • What happens to waste? • How do people deal with conflict? • How do we deal with destroyed environments • What is the response to natural disasters § Punishment not by separating people from society (and stigmatising), more communal service, but different approaches for serious crimes (murder, rape...) § Gender equality should be a central aspect

People - Nature		• What do landscapes/seascapes look like? • What does the environment look like? • What do people look like? • What is the status of biodiversity?
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1017SM.4 Vision coding

1018 The workshop resulted in the creation of five visions (N=5), each consisting of a public-facing
1019 performance presented during the workshop and a written summary compiled from collective
1020 group notes. Common themes and concepts emerged across the visions, reflecting envisioned
1021 shifts in values and principles, as well as economic and political transformations.

1022

1023 *Peace, harmony, and connection*

1024 The visions depict futures characterised by peace, connection, and harmony - at all levels of
1025 society and between people and nature.

1026 Mediation (n=3) is highlighted as a mechanism at all levels of society: for resolving global
1027 conflicts through dialogue and intelligence, fostering cooperation between nations facing
1028 common challenges, serving as an institutional tool, and training police officers to manage
1029 situations through mediation. Four visions (n=4) emphasise the reduction or peaceful resolution
1030 of conflicts in different contexts. In these imagined futures, interpersonal conflicts are
1031 addressed through mediation, ecological borders help mitigate border conflicts, and global
1032 conflicts are ‘calmly resolved through dialogue and intelligence’. Additionally, human-wildlife
1033 conflicts have been successfully managed.

1034 Beyond conflict, the concept of harmony is a recurring theme in most visions (n=3) including
1035 in one of the titles of one vision. In these futures, harmony is particularly emphasised in the
1036 relationship between humans and nature but also extends to the balance between nature and
1037 technology, the connection between academia and governance, and the use of international
1038 treaties to align conservation efforts.

1039 A deeper connection between people and nature is highlighted in four visions (n=4). This
1040 deeper connection is amplified through various means, such as art, recreation, spatial and urban
1041 management, sustainable agriculture, education and work. It is also portrayed as an inherent
1042 and essential aspect of human life:

1043 ‘Humans pursue their inherent tendency to seek connections with the natural world.’ [NN --
1044 not sure if specific visions should be mentioned in quotes]

1045 Most visions (n=3) also emphasised the importance of collaboration and cooperation in
1046 fostering stronger connections and working together toward shared goals.

1047

1048 *Living differently*

1049 Visions imagined new ways of living, from how people engage in society to how they make
1050 decisions, consume, work, and feel.

1051 Social justice is envisioned as a key tool for fostering a more equitable society, with four
1052 visions (n=4) incorporating elements such as intergenerational justice, reduced inequalities,

protections for minorities, universal basic income, and equal treatment under the law. One vision states:

‘Inequalities have reduced, with social justice a priority.’.

Decentralised decision-making is emphasised in four visions (n=4), where power is more distributed, individuals and local communities are more involved, direct democracy prevails, and local entities are empowered to drive local decisions and influence regional and international dynamics. In these futures, decision-making reflects the needs of both people and nature, as captured in the following excerpt:

‘Decision-making is decentralised and done collectively, rooted in communities and putting well-being at the forefront, with Mother Earth and us as part of that.’ [NN-NC – not sure if specific visions should be mentioned in quotes]

Decentralisation extends beyond governance, with most visions (n=4) emphasising a strong focus on localism. Local food production is prioritised, biodiversity is cherished and reintroduced, traditional knowledge is valued, and local manufacturing is supported.

This emphasis on localism aligns with the central role of communities (n=4) in these futures. Community-driven initiatives shape production, decision-making, agriculture, and energy markets. Communal living is embraced through shared spaces, co-owned properties, and community services.

Communities and individuals are also depicted as more resilient (n=4) in the visions. Resilience is another key theme across four visions (n=4). Communities are portrayed as more resilient to climate change, individuals as mentally stronger, and society as a whole is more resilient.

Visions also reimagine urban spaces, with three (n=3) envisioning greener cities that enhance biodiversity, human health, and well-being. Nature is further integrated into education (n=4) and employment (n=3). Education is depicted as nature-focused, inclusive of all age groups, and providing a wide range of skills including green skills. Meanwhile, the labour market is imagined placing greater emphasis on environmental jobs, with more demand for such jobs.

Finally, most visions (n=3) foresee improved mental health outcomes, achieved through greater recognition of mental well-being and deeper engagement with nature.

An economic transition

Four (N=4) broadly referred to a more sustainable economy, where economic mechanisms are leveraged to promote sustainable outcomes. Proposed measures include the use of import taxes based on travel footprints of goods, taxes set by businesses and communities, Debt for Nature Swaps, and a broader transition to a shared, localised, and circular economy. Three visions (N=3) specifically mention the shift to a circular economy.

All visions (N=5) depict changes in two major economic sectors: agriculture and technology.

1089 All visions see agriculture as more sustainable and respectful of the importance of nature.
1090 Agriculture is envisioned as regenerative, more local and seasonal, boosted by urban farming,
1091 and supported by technology.

1092 Technology is similarly reimagined as a tool for environmental protection and sustainable
1093 progress in all five visions (N=5). Proposed applications include innovations that make
1094 agriculture more sustainable, smart solutions for resource efficiency, energy-saving
1095 advancements, and artificial intelligence (n=2) to support ecosystem restoration and human
1096 well-being.

1097

1098 ***Nature: appreciated and abundant***

1099 In these imagined futures, nature holds a central place in society. Four visions (n=4) emphasise
1100 an appreciation of nature, as captured in the following excerpt:

1101 ‘There is a general appreciation of nature within societies, which is manifested in the physical
1102 abundance of non-human-made nature as well as the mental and spiritual (re)integration of
1103 nature as an integral cultural element.’.

1104 All five visions also present a future where wildlife is more abundant (N=5), and where diverse
1105 species and ecosystems thrive and coexist with humans, including in urban areas.

1106**SM.5 Seeds and vision narratives**

1107 Table SM.2 summarises the initial conditions and mature conditions of the seeds selected by
1108 each group. Furthermore, written narratives of the visions elaborated based on the Future
1109 Wheels (one for each seed) are included below.

1110

1111 Table SM.2 | Selected seeds by vision group in their initial and matured conditions.

Vision group	Seeds in initial condition	Seeds in mature condition
NS	Green bus stop roofs to foster insect biodiversity in urban settings	Various urban buildings have green roofs with plants attracting pollinators, vegetables for residents, and water filtration systems
	Pollinators Day in Hungary to raise awareness about Nature’s Contributions to People	A European and Central Asia platform for pollinator protection is established, with yearly gatherings to set targets and contributions
	European Green Belt Initiative: A transnational environmental and conservation initiative aimed at preserving and connecting natural habitats along the former Iron Curtain, promoting biodiversity and sustainable development	Strengthened green belt initiative with regional branding for tourism and education and similar implementation in other (post-conflict regions for conservation and peacebuilding
NN	Rewilding and reintroduction of keystone species in their former ranges	Reintroduced species thrive in self-sufficient ecosystems without ecological barriers
	Wildflower bank for the creation or enhancement of wildflower-rich habitats through Biodiversity Net Gain Units	Wildflower banks are well established, thus ensuring the long-term preservation of natural heritage
	Civil society movement for the protection of Vjosa river	Justice systems rule in favour of environmental cases
NS - NC	Student initiative to encourage urban dwellers to green the city and educate them on the importance of green spaces, e.g. for (mental) health	Health for people and nature is embedded in formal and informal education for all ages
	Reduction of intermediaries between farmers and consumers and encourage local product consumption	Over 80% of food consumed is local, seasonal, and sustainably produced

Vision group	Seeds in initial condition	Seeds in mature condition
	Research project on the relationship of urban lifestyles and insect diversity for a better understanding of insect biodiversity dynamics in urban settings	All urban gardens and spaces are managed for high insect biodiversity, benefiting both people and nature
NN - NS	Debt-for-nature swaps: financial mechanism where a portion of a country's debt is forgiven or purchased in exchange for investments in conservation measures	Specialised unit in the International Monetary Fund for debt regulation in exchange for nature conservation with standards and proper monitoring
	Reintroduction of local plant and animal varieties more adapted to local environments	Urban areas have ecosystem service units for the sustainable and safe reintroduction of plants and animals
	Non-profit organisation helping youth land green jobs	Global platform with opportunities for green jobs at all scales from local to global
NN - NC	'Education through Culture': cluster of nature education initiatives, including nature awareness training in formal education institutions, land-based educational curricula rooted in Indigenous knowledges, and informal education programs	Education systems prioritise outdoor and experiential learning with practical skills like gardening or traditional nature-inspired handmade handicrafts, incorporate indigenous knowledge, and are oriented towards skills for community building rather than economic growth
	Global Youth Biodiversity Network (GYBN): An international network of youth organisations and individuals to lead, support, and accelerate action towards living in harmony with nature	Active youth participation in international biodiversity policy is expanded and strengthened, with resources allocated to youth engagement and enhanced recognition of bottom-up initiatives
	The concept of Mother Earth as an approach to biocultural conservation	The provisions of Mother Earth as well as local values are recognised and respected, land is returned to local communities, and traditional knowledge and biodiversity are recovered and sustainably used

1112

1113

1114 *(Re)discovering the (economic?) value of nature*

1115 The Nature for nature - Nature for society group built a vision centred around the (re)discovery
 1116 of nature's economic value, driving conservation actions in the long term. This vision is based
 1117 on both acknowledging nature's intrinsic and instrumental value with a focus on integrating

market-based mechanisms to quantify and recognise nature's contributions to people. In this vision, initiatives like 'Debt for Nature Swaps', allowing countries to exchange economic debt for public investments into conservation interventions, evolve into a well-established global scheme with agreed rules and procedures. This further boosts demand for conservation jobs and fosters local reintroduction of plant and animal varieties, in turn creating economic opportunities at different scales such as eco-tourism. The conservation job market flourishes, leading to the launch of a global platform for green jobs that promotes intercultural collaboration and knowledge transfer. Deep societal changes ensue, with people developing a deep connection with nature. Cities transform into decentralised green spaces, promoting human-nature coexistence. At the same time, society and ecosystems become more resilient, reducing climate-driven migrations. This vision of rediscovering nature's value depicts a harmonious future where humanity and wildlife coexist. The clear costs of inaction drive a more ambitious conservation-oriented future.

Naturecultural Cities One with nature - in mind and in soul

The Nature for society - Nature as culture group built a vision based on instrumental and relational values of nature with a focus on urban spaces where human-nature relationships are deeply integrated into society, education, and culture, leading to a widespread appreciation and understanding of nature. In this envisioned future, nature is not only physically abundant in cities in the form of green spaces, biodiverse gardens and green rooftops but also an integral part of cultural practices and societal organisation. A strong sense of community is central to all aspects of life. More shared property and living spaces, decentralised governance and a shift towards well-being economies. Communities are structured around more shared property, living spaces and green areas, which encourage sustainable practices and social cohesion and a sense of collective responsibility. Based on a sense of collective responsibility, governance is decentralised, allowing people to actively engage in decisions that impact their communities and the environment. The economy is based on a circular and shared system, where fulfilment and collective well-being replace the idea of constant economic growth as measures for a good life. Unconditional basic income supports this model, ensuring that everyone has access to the necessities of life, and allowing people to work in roles that contribute to societal well-being and environmental stewardship. Various sectors undergo transformative changes. Education plays a key role, with curricula at all levels fostering a deep understanding of the interconnectedness of humans and nature and promoting lifelong and intergenerational learning. This interconnectedness is also reflected in food systems production, where around 80% of food is grown locally and seasonally and biodiversity is valued as a fundamental element in local culinary cultures. Human (mental) health and well-being of people and nature are prioritised through a holistic health system that recognises the importance of nature for human wellbeing. This vision depicts a future where environmental stewardship is part and parcel of a harmonious and healthy society, relying on interconnected communities, and where the economy supports sustainable and equitable living.

Rewilding, Wildflower banks and Free Rivers

The Nature for Nature group envisioned a world where ecosystems are fully self-sufficient and harmoniously integrated with human activities, aligning with an intrinsic value of nature. This vision emphasises a profound respect for nature, characterised by self-regulating ecosystems where human intervention is minimal and natural processes are allowed to prevail. In this future, urban environments seamlessly incorporate natural elements, blending advanced technologies with environmental stewardship. Key elements of this vision include the successful reintroduction of keystone species, the establishment of extensive wildflower banks ensuring biodiversity and widespread adoption of sustainable practices such as regenerative agriculture and clean energy. The narrative also highlights the deep connection between people and nature, where every species, from the smallest insect to the largest tree, is valued for its role in maintaining ecological balance. This heightened appreciation fosters reduced stress levels and improved mental health among individuals, reinforcing a holistic symbiosis between humanity and the environment. The vision extends to global cooperation, where countries establish green borders to facilitate species migration and mitigate conflicts, fostering an interconnected and resilient ecological network. This collaborative approach enhances biodiversity conservation efforts, aligning economic development with environmental sustainability and ensuring that humanity and nature thrive together.

Celebrating nature through culture: What did you forget?

The envisioned future for the Nature for Nature - Nature as Culture group emphasises intrinsic and relational values of nature and is characterised by a deep-rooted respect for Mother Earth and a commitment to peaceful, nature-positive and nature-inspired cultural practices. This vision highlights a reciprocal relationship between humanity and the environment, where resource exploitation is replaced by celebration and cherishing of nature for what it is and the resources it provides. In this future, sustainable practices are embedded in daily life, with smart solutions minimising resource use and enhancing ecosystem service sustainability with people's wellbeing through culture (including multigenerational learning, art and handicraft, gardening, etc.). Storytelling has a central role in communicating positive attitudes and creative solutions for the nature-friendly futures. Communities adopt healthy agricultural systems that integrate nature and protect natural areas from harm. Education evolves to focus on practical, creative, and holistic learning, incorporating green skills, hands-on projects and critical thinking. This system fosters a resilient society capable of informed, community-centred decision-making, prioritising well-being and environmental respect. Meanwhile, youth has gained a proper seat at the table of policy discussions and its voice is heard thanks to Global Youth Biodiversity Network (GYBN) providing a platform for youth to unite for Mother Earth within the CBD negotiations. Thus, youth play a pivotal role, with the GYBN facilitating global connections, learning from each other, opportunities and funding for young people initiatives. The approach ensures that decision-making is decentralised, collective and inclusive, promoting non-violence and intergenerational justice while integrating diverse perspectives and local knowledge.

1200

1201 *Local societies for a sustainable global future*

1202 The vision articulated by the Nature for Society group, emphasising instrumental values of
1203 nature, envisions a future where a balanced focus on individuals and communities harmonises
1204 with democratic governance and educational reform. This future promotes a decentralised
1205 democracy, with local, non-hierarchical decision-making structures and expertise-driven
1206 governance. Equality before the law is paramount and non-human entities are also given a
1207 voice through expert and stakeholder involvement in governance. Education is reimagined to
1208 emphasise environmental awareness, practical skills and social values over traditional
1209 academic metrics. This approach integrates green skills, creative problem-solving and a deep
1210 respect for nature, leading to a society where nature's protection is a fundamental value rather
1211 than a cause. Global and regional issues are tackled through collaborative local efforts, with
1212 binding agreements crafted through inclusive negotiations. Agricultural practices are enhanced
1213 with innovative technologies and a shift towards plant-based diets, reducing environmental
1214 impact while adapting to new food cultures. The vision also transforms product use and
1215 fashion, prioritising sustainability and local production over fast fashion and profit-driven
1216 competition. AI and automation support sustainability by reducing monotonous work, allowing
1217 people to engage more deeply with creative and recreational pursuits. Restoration efforts are
1218 guided by a dual focus on human and natural needs, incorporating scientific assessments to
1219 ensure both biodiversity and ecosystem service enhancement. Overall, this vision fosters a
1220 future where human well-being and environmental health are intertwined, supported by
1221 equitable governance, transformative education and sustainable practices.

1222