PBL Netherlands Environmental Assessment Agency

PATHWAYS TOWARDS JUST AND NATURE-POSITIVE FUTURES

Exploring the conceptual building blocks

Lucas Rutting, Machteld Schoolenberg, Lucy Oates, Lizzy van Megen, Katie Minderhoud, and Timo Maas

June 2026

Colophon

Pathways towards just and nature-positive futures. Exploring the conceptual building blocks

The Hague, 2026
PBL publication number: 5890

Corresponding author
lucas.rutting@pbl.nl

Author(s)
Lucas Rutting, Machteld Schoolenberg, Lucy Oates, Lizzy van Megen, Katie Minderhoud, and Timo Maas

Acknowledgements
We would like to thank Marcel Kok for his supervision, support and all the suggestions he shared as inspiration. We thoroughly thank our external reviewers Patrick Huntjens and Katinka Wijsman as well as our internal reviewers Michiel de Krom, Clara Veerkamp and Anet Weterings for their valuable reviews. Furthermore, we thank Filip de Bois (figures) and Marte Stinis (English and editorial) and Martine Uyterlinde (supervision).

Visualisations
Beeldredactie PBL

Production coordination
PBL Publishers

Accessibility
PBL attaches great importance to the accessibility of its products. Should you encounter any access-related problems when reading them, please contact us at info@pbl.nl, stating the title of the publication and the issue you are experiencing.

PBL Netherlands Environmental Assessment Agency is the national institute for strategic policy analysis in the fields of the environment, nature and spatial planning. We contribute to improving the quality of political and administrative decision-making by conducting outlook studies, analyses and evaluations in which an integrated approach is considered paramount. Policy relevance is the prime concern in all of our studies. We conduct solicited and unsolicited research that is both independent and scientifically sound.

Contents

Summary

The global biodiversity crisis is calling for transformative change to move towards just and nature-positive futures, as is formulated in the 2050 vision and 2030 mission of the Kunming-Montreal Global Biodiversity Framework (GBF). This study responds to these ambitions articulated in the GBF following the conclusions of the IPBES Global Assessment report. Recent IPBES reports have defined transformative change as 'a fundamental, system-wide reorganisation across technological, economic and social factors, including paradigms, goals and values'. The concept of 'nature-positive' was introduced to allow conceptualising visions of and provide a sense of direction for desired futures for nature and people in which we have more nature than we have today. As such, nature-positive refers to both *halting* and *reversing* biodiversity loss and *restoring* nature.

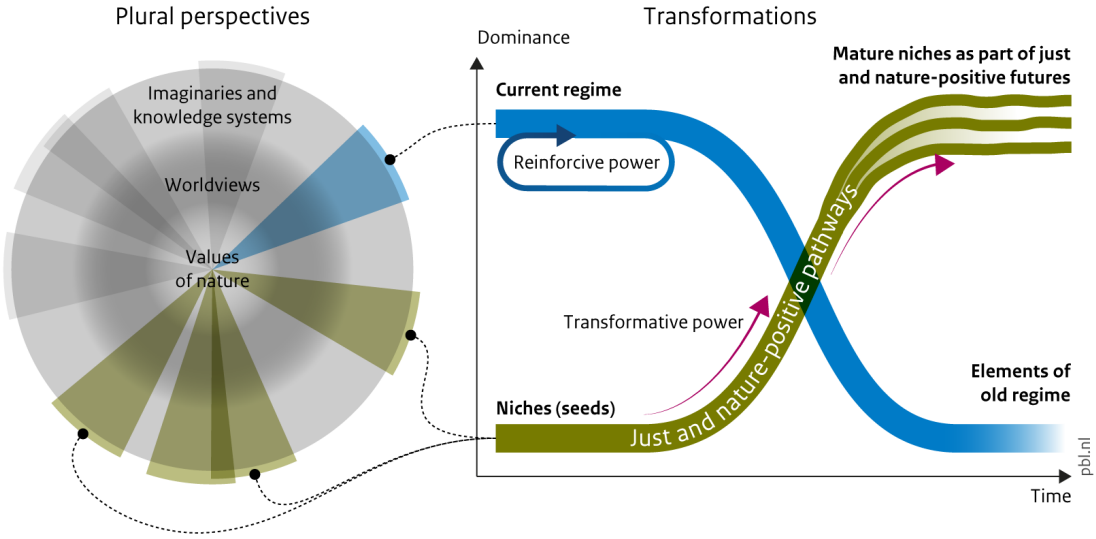
While there is already some research on nature-positive futures, it still is an open question what pathways towards such futures could look like. Current research predominantly comprises quantitative and model-based studies, with limited but increasing representation of social sciences and humanities. This is a missed opportunity, as addressing the underlying causes of biodiversity loss, such as the disconnection between people and nature, concentration of power and wealth, and prioritisation of short-terms gains, are inherently political and economic questions. Social science knowledge could play a crucial role in better understanding these causes and contribute to addressing biodiversity loss by providing policy-relevant knowledge on how to create structural, systemic and enabling conditions for transformative changes.

This study intends to address this gap in the scholarship, i.e. the underrepresentation of the social sciences, and support researchers in the (international) biodiversity-focused science-policy interface to envision and analyse transformative pathways towards achieving the GBF goals and targets. As such, this report contributes to the emerging social science scholarship on transformative pathways towards just and nature-positive futures. It builds on other, similar attempts, such as the BIONEXT and NatureScapes projects. It aims to provide the basis for analysis within the International Nature Policy Programme of PBL and beyond, by introducing a conceptual framework (see Figure 1) which combines a number of crucial insights from the social sciences, and is intended to support the conceptualisation of transformative pathways towards just and nature-positive futures. We developed this framework through an extensive literature study and expert consultations.

Central to our framework are a number of conceptual building blocks, that together provide insights into the dynamics of transformative change. These include *pathways,* which are scenarios that connect the present with some type of normative future (whether it be visions, goals, or targets); *justice*, which emphasises ensuring fair and equitable outcomes for nature and people; *nature-positive*, which entails both halting and reversing biodiversity loss and restoring nature; *transformations*, which refers to the fundamental changes that are needed to realise nature-positive futures; and *plurality*, i.e. the need to recognise diverse perspectives, imaginaries, knowledge systems, and values of nature in identifying just and nature-positive pathways. In addition, our framework pays attention to the role of power dynamics in transformative change as an important underlying factor, as nature-positive pathways imply a shifting away from existing practices and potential conflict with vested interests and business as usual.

Figure 1

Framework for conceptualising transformative pathways towards just and nature-positive pathways



Source: PBL

This framework positions justice as an ambition as well as a guiding principle and a critical lens for developing pathways towards just and nature-positive futures. In positioning justice as central, the framework draws attention to the importance of creating space for marginalised voices and alternative knowledge systems in collectively imagining diverse possible just and nature-positive futures and pathways towards them. Simultaneously, in this approach, justice functions as a tool for reflexivity for those developing and using these pathways, prompting a reflective stance to one's own positionality and assumptions about the future.

Based on the conceptual framework, this study also provides guidance, including a number of practical and participatory tools, on how to develop just and nature-positive pathways. This report provides several examples of tools, including the Three Horizons Framework, the Seeds approach, the Transformation Flower Approach, and the Nature Futures Framework. Central to these approaches is that they do justice to the importance of inclusive participation, help to foster reflexivity, and create understanding of power dynamics among stakeholders in exploring, developing or analysing nature-positive pathways.

The framework introduced in this report can be regarded as a starting point for enriching scenarios work in the science-policy interface. An important step will be the application of this research in combination with quantitative scenario-analysis that explore nature-positive pathways. As such, this study aims to inspire efforts to develop just and nature-positive pathways that combine social science and model-based scenario-analysis. The framework should be seen as an evolving one and we therefore invite further dialogue, feedback, and enrichment through practice and engagement with diverse contexts.

It is important to note that this study does not explicitly engage with the ways in which transformative pathways can inform actual policy development and biodiversity governance more generally. These are crucial steps that need to be addressed in follow-up studies.

1 Introduction

In 2022, the parties to the Convention on Biological Diversity (CBD), including the Netherlands, adopted the Kunming-Montreal Global Biodiversity Framework (GBF) (CBD 2022). Underscoring the need for a transformative approach, following the conclusions of the IPBES Global Assessment (2019), the GBF 'sets out an ambitious plan to implement broad based action to bring about a transformation in our societies' relationship with biodiversity by 2030, in line with the 2030 Agenda for Sustainable Development and its Sustainable Development Goals, and ensure that, by 2050, the shared vision of living in harmony with nature is fulfilled' (CBD 2022). The overall goal of the GBF is that **'by 2050, biodiversity is valued, conserved, restored and wisely used**, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential **for all people**'. In addition, the framework articulates a mission for the period up to 2030 to 'take urgent action to halt and reverse biodiversity loss to put nature on a **path** to recovery for the **benefit of people and planet** by conserving and sustainably using biodiversity and by ensuring the fair and equitable sharing of benefits from the use of genetic resources, while providing the necessary means of implementation'. To underscore the urgency of halting biodiversity loss, the GBF explicitly defined four goals and 23 targets to elaborate on its 2050 vision and 2030 mission (CBD 2022). The assessments conducted under the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) highlight the urgency of the biodiversity crisis (IPBES 2019), the need for exploring scenarios towards positive futures for nature and people (IPBES 2023, 2016), and the need for transformative change to address underlying causes and indirect drivers of biodiversity loss (IPBES 2024). Moreover, the GBF emphasises the need for a *human rights-based* approach to reaching its goals and targets (CBD 2022), and both the IPBES Transformative Change and Values Assessments underscore the need for *just* transformative change (IPBES 2022, 2024).

In this study, we respond to the ambitions articulated in the GBF and the calls in the various IPBES assessment reports, by introducing a conceptual framework for developing pathways toward just and nature-positive futures. In line with the GBF, the scope of our report is global, while allowing for adaptability to regional, national, and local levels, and across geographical scales. This report is primarily written as a resource for researchers and other experts operating in the international science-policy interface around biodiversity, and/or those involved in developing scenarios towards GBF targets.

This study is part of a project initiated by the International Nature Policy Programme at the Netherlands Environmental Assessment Agency (PBL) which aims to explore and support the development of different scenarios, or pathways, towards a just and nature-positive future. As such, this report also serves as a methodological point of departure for this project on just and nature-positive pathways at PBL. The report does not explicitly address how transformative pathways can inform actual policy development and governance. It does, however, provide a starting point for ongoing dialogue. It is meant to be a dynamic contribution that needs to be examined, questioned, and refined through practical application and collaboration with various stakeholders across different contexts.

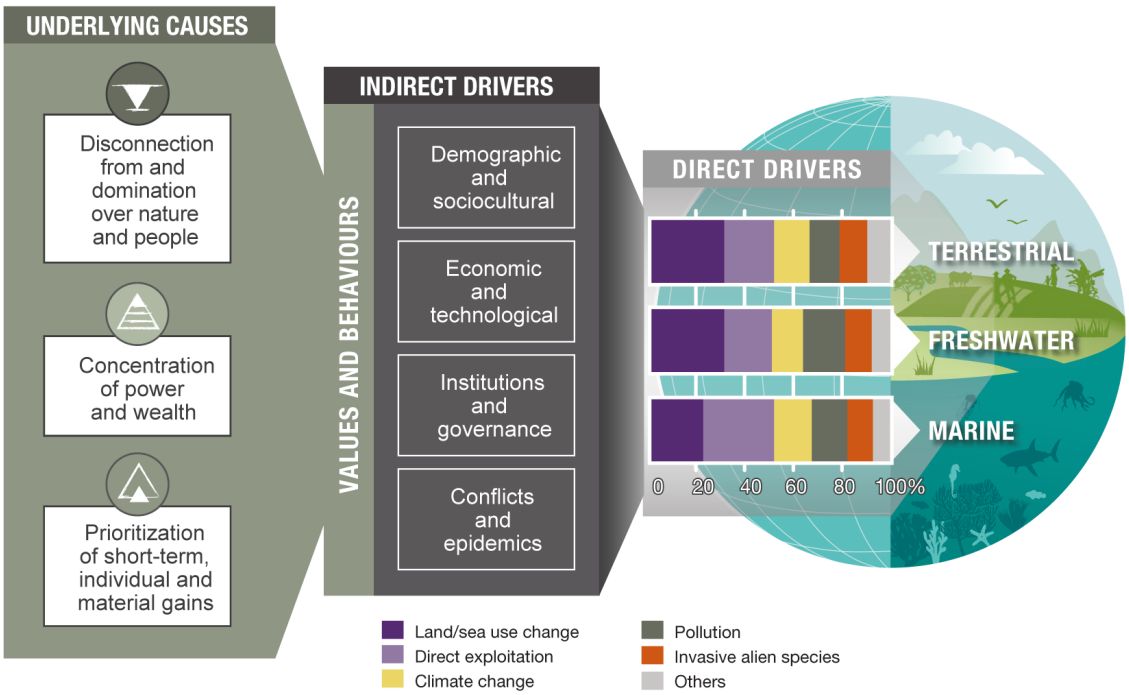
1.1 The biodiversity crisis calls for transformative action

Drivers of biodiversity loss

The impacts of the global environmental crises we are facing today – biodiversity loss, climate change, pollution, and the interplay between these – on life on earth are unprecedented. For instance, around one million species are critically endangered and many of them are at the brink of extinction (IPBES 2019). A range of factors are causing biodiversity loss, both directly and indirectly (IPBES 2024; see Figure 2). Direct drivers include land and sea use change, direct exploitation of organisms, climate change, pollution, and invasive alien species (IPBES 2019). These direct drivers are in turn influenced by indirect drivers, such as demographic, economic, institutional, or technological factors, all underpinned by societal values and behaviour, and underlying causes, such as the global concentration of power and wealth (Díaz et al. 2019; Visseren-Hamakers and Kok 2022). A key indirect driver of the aforementioned crises is the way current economic systems are organised, including their deep reliance on and unsustainable extraction of natural resources and ecosystems and the institutional arrangements that shape patterns of production and consumption.

Figure 2

Underlying causes, indirect drivers and direct drivers of biodiversity loss and nature's decline



Source: Taken from IPBES 2024

Human beings rely upon nature for food, water, and other resources, but also for climate regulation, nutrient cycling, and primary production (Díaz et al. 2018). Moreover, people feel connected to nature in various ways and consider it part of their individual and collective identity (van Dam et al. 2024). Loss of biodiversity therefore affects human health and well-being on a global scale. However, this loss disproportionally impacts the most vulnerable communities, who often lack the financial means to pay for 'substitutes for previously freely-available natural resources and services' (Roe et al. 2019). The prevailing ways in which current economies and

societies view, value, and utilise natural systems are putting nature's contributions to human well-being at risk, as well as their own stability. If we are to address these challenges, as the GBF intends to do, this would require a radical shift in the ways in which we interact with nature (IPBES 2024).

How to tackle biodiversity loss?

As the IPBES states, it is necessary to address the underlying causes of biodiversity loss rather than just its consequences, i.e. the 'deeply rooted and interconnected social and cultural patterns that shape, influence and reinforce all direct and indirect drivers of biodiversity loss' (IPBES 2024). Such drivers include the disconnect between people and nature, the prioritisation of short-term benefits, and the concentration of economic and political power, to name a few. Specific measures for nature-positive pathways range from the need to ambitiously protect and restore nature across all levels and regions, to a wide range of 'sustainability options' including technological solutions and efficiency measures, such as enhancing productivity in agriculture or mitigating pollution, mitigating climate change, and dietary changes, to achieve a harmonious co-existence with nature (IPBES 2019; Kok et al. 2023; Leadley et al. 2022; Leclere et al. 2021).

Moreover, there is a need to reimagine the ways in which production and consumption systems are organised, and to interrogate how value systems influence indirect drivers (IPBES 2024). Addressing the environmental crises therefore requires not only a shift in how we interact with nature, but a broader societal paradigm shift in how economies, governance systems, and human–nature relations are organised and valued, i.e. transformative change (Huntjens et al. 2025). The IPBES Nature Futures Framework (NFF), which builds on different values of natures, shows how alternative nature-positive pathways can be envisioned (Lundquist et al. 2021). However, currently, 'bending the curve for biodiversity' (see Figure 5) is too often depicted as a single pathway. Aligned with the NFF, different visions and scenario pathways of how to realise a nature-positive future have already been elaborated. Examples include the Half Earth (*land sparing*) and Sharing the Planet (*land sharing*) scenarios (e.g. de Bruin et al. 2023; Immovilli and Kok 2020).

Box 1: A brief history of global biodiversity governance

There is a long history of nature conservation, ranging from local to global initiatives. It can be traced back to colonial times (i.e. the 19th and early 20th century), in which the formation of protected areas was often characterised by the dispossession and displacement of local communities (Büscher and Fletcher 2019). The first formal and globally organised governance efforts to conserve nature, however, are more recent: the International Union for Conservation of Nature (IUCN) was founded in the 1940s, followed by the establishment of the World Wildlife Fund (WWF) in 1961. At first, these attempts were rather siloed and focused primarily on biodiversity conservation and management of protected areas. This period, that lasted until the early 1990s, can be characterised as the first era of global biodiversity governance (Visseren-Hamakers and Kok 2022). The adoption of the Convention of Biological Diversity (CBD) in 1992 at the United Nations Conference on Environment and Development (UNCED) marked the beginning of a second era, characterised by a broadening perspective on nature conservation. During this era, the initial focus was on the CBD's three main objectives: to conserve biological diversity, to sustainably use ecosystems, and to fairly and equitably share the benefits arising from the utilisation of genetic resources (CBD 1992). Subsequently, in 2002, the parties to the CBD agreed upon targets to significantly reduce the rate of biodiversity loss in 2010. After these targets were not met, new ones were formulated in 2010 – the Aichi targets for 2020 – which, again, were not met. Simultaneously, in 2015, the United Nations Sustainable Development Goals (SDGs) were adopted, which integrated broader sustainability and environmental justice concerns into an overarching transformation agenda. With the SDGs, a third, more integrative era of biodiversity governance began, culminating in the adoption of Kunming-Montreal Global Biodiversity Framework (GBF) in 2022 (CBD 2022). As acknowledged in the GBF, it is now evident that we need to seek a more profound form of change to confront the intertwined crises we are facing, i.e. transformative change (IPBES 2024).

The need for a transformative approach

Historically, international biodiversity frameworks and targets have not been able to prevent further loss of biodiversity (see Box 1). This clearly shows that there is a need for rethinking the relationship between humans and nature in ways that are effective in addressing biodiversity loss (IPBES 2024). As transformative change pertains to both social and personal transformation, we need to be cognizant of shifts in values, beliefs, and social behaviour, including the plurality of ways in which people value nature (Chaffin et al. 2016; Otsuki 2015). In practice, such transformative change will require fundamental shifts in the ways in which societies are organised, and these will not happen overnight. However, smaller, incremental changes in the shorter term, including radical incrementalism (Hajer and Oomen 2025) and 'small wins' (Termeer and Dewulf 2019), will also be needed as steps towards more profound, longer-term transformative change.

To address this need for transformative change requires further expanding and deepening the current repertoire of nature conservation efforts, as the 'goals for conserving and sustainably using nature and achieving sustainability cannot be met by current trajectories, and goals for 2030 and beyond may only be achieved through transformative changes across economic, social, political and technological factors' (IPBES 2019). Crucially, envisioning transformative change necessitates thinking about the future – there is a need to imagine and develop scenarios that represent transformative alternatives to these current trajectories. To this end, it may be beneficial to embrace perspectives and visions of a wide range of actors, including those who have not always been well-represented in such discussions (IPBES 2024).

Imagination is crucial for engaging with transformative change

The IPBES Transformative Change Assessment states that redefining the ways in which people and nature relate to each other requires 'basing new visions on inclusive, just, diverse and forward-thinking approaches that address the underlying causes of biodiversity loss' (IPBES 2024). To be effective, such visioning processes could be guided by principles of equity and justice, pluralism and inclusion, respectful and reciprocal human-nature relationships, and adaptive learning and action. Similarly, in a recent agenda-setting article, Avelino et al. (2024) concluded the literature on these topics is still rather fragmented. They therefore argue the need to more forcefully connect the concepts of justice, sustainability, and transformations. Relatedly, there is consensus among scholars and practitioners that (sustainability) transformations may call for radical alternatives to current realities (Rutting et al. 2024a). This implies the need for fundamentally reimagining the way social and ecological systems interact, which, in turn, allows for rethinking the way these interactions are organised, emphasising solutions that are more sustainable, just, and equitable (Milkoreit 2017; Moore and Milkoreit 2020).

1.2 A conceptual framework for just and nature-positive pathways

What this report aims to contribute

In this study, we respond to calls for more pluralistic and inclusive explorations of biodiverse futures for nature and people, as well as the need for guidance on co-creating interdisciplinary, participatory processes for such explorations. For instance, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) argues that scenarios should reflect the plurality of perspectives, values, and imaginaries in society that underly people's ideas of desirable futures for both humans and non-humans (IPBES 2024, 2022). This implies the need to imagine and develop scenarios towards reaching the GBF goals and targets in a just way. This can help inspire policies that are both more inclusive and effective. In addition, such scenarios need to be nature-positive, which refers to both halting and reversing the loss of nature and biodiversity. In this report, we refer to such scenarios as just and nature-positive pathways. Exploring what just and nature-positive pathways could look like, can help to mobilise action and inspire more ambitious decision-making. We build on earlier work on nature-positive pathways conducted at PBL, published in the run-up to the 2022 United Nations Biodiversity Conference of the Parties to the CBD (COP15) held in Montreal, Canada (Kok et al. 2022).

While there is already some existing research on pathways towards nature-positive futures, it predominantly comprises quantitative and model-based studies (see for example Aschi et al. 2026 for an overview). The social sciences and humanities tend to be underrepresented in these studies. This is problematic, as the indirect drivers and underlying causes of biodiversity loss are primarily political (see Figure 2). Moreover, it potentially risks neglecting or superficially addressing issues of justice and equity, and may inadvertently reproduce unjust and unsustainable relations in the process. In this study, we adopt a more inclusive approach that acknowledges and embraces a plurality of worldviews and knowledge systems, thereby responding to this call for an increased presence of the social sciences and humanities (IPBES 2024). In doing so, we advocate for the coexistence and fruitful exchange (while sometimes also acknowledging incommensurabilities) of different knowledge systems, cultural practices, and beliefs (Escobar 2020).

We aim to contribute to the emerging line of social science-based scholarship on nature-positive futures by introducing a conceptual framework that builds on existing research linking transformative change to the concepts of justice and plurality, while also recognising the role of power dynamics. We believe that this framework can serve as a strong conceptual basis for developing just and nature-positive pathways. We argue that such pathways can help decision-makers as well as societal actors to explore and navigate pathways to a just and nature-positive future, enabling them to articulate their needs to governments to make these changes happen. In turn, governments can learn from this bottom-up approach to societal change, to develop transformative policies that inspire action towards achieving the GBF goals and targets in a just way.

Justice as an overarching and cross-cutting element

The overarching and cross-cutting element in this study is the concept of justice. As elaborated upon later in this report, justice can be framed and operationalised in different, complementary ways (both in the ways in can be sought in society, see section 2.2, as well as in research and participatory processes, see section 3.1). In line with the GBF goals and targets, justice can be an ambition, and, as such, be sought as an outcome of transformative change. Of a different kind is the way in which justice can be used as a lens to interrogate underlying power dynamics, structural inequities, and trade-offs between actors' stakes and goals in processes of transformative societal change. Moreover, the concept of justice can be used as a tool for reflexivity; we aim to critically reflect on each step of the research process, acknowledging our positionality as researchers, reflecting on the assumptions and choices we make, and examining the biases resulting from our respective backgrounds. Finally, justice also refers to inclusiveness. By elaborating on these different operationalisations of justice, we aim to complement the existing literature on scenario development and simultaneously create space for alternative and innovative perspectives on how to reach the biodiversity goals and targets.

Box 2: The Just and Nature-positive Pathways project at PBL

This study is part of a project that that was initiated under the International Nature Policy programme (IN) at PBL, which was established in response to the adoption of the GBF on 19 December 2022. The IN programme aims to contribute to achieving the GBF goals through supporting international decision-making, knowledge production, and international assessments. The project advances the goal of the IN programme to explore and articulate pathways towards achieving the long-term GBF goals from a social sciences perspective, examining how societal dynamics, governance structures, and cultural contexts shape the transformative change that is needed.

The project aims to explore and develop pathways with a wide range of societal stakeholders for a range of thematic areas such as nature in cities, landscapes, and biodiversity, business, and finance. These pathways will be based on both existing scenarios and visions of societal actors and knowledge holders, and deliberate stakeholder consultations, e.g. participatory scenario development workshops. These will take place in 2026-2027. In turn, these pathways can inform and inspire policies and other governance proposals aimed at transformative change towards the GBF goals and targets.

In parallel, we will engage in a two-way dialogical learning process with colleagues focusing on quantitative scenario modelling on how to integrate the conceptual building blocks we discuss in this report in quantitative futures work as well.

In doing so, this project responds to IPBES's call to further test and discuss the Nature Futures Framework (NFF; described in detail in Chapter 4), a framework aimed at distinguishing and articulating different types of values of nature underlying people's worldviews and perspectives in scenario development (IPBES 2023; Pereira et al. 2020).

Importantly, this study does not stand in isolation. Rather, it exists within a broader landscape of related research initiatives. It builds upon and connects with a number of comparable studies, e.g., BIONEXT, NatureScapes and DAISY (Digital, technological and Social innovation mixes enabling transformation for biodiversity and equity), all three looking into the implications of transformative change towards sustainability for biodiversity as well as climate and social justice. Collectively, these efforts contribute to an emerging base of knowledge.

Towards a conceptual framework: Our methodological approach

As a first step, we conducted a focused literature study, starting with in-depth reading and discussion sessions of Scoones' work on transformations (Scoones et al. 2020), the Nature Futures Framework methodological guidance (IPBES 2023), and a recent PBL report on just transitions (Oates and Verveld 2024), to discuss and exchange relevant conceptual building blocks to further explore. From there, based on our expertise and experience as well as snowballing from the references used for the IPBES assessments, we drew on a variety of literatures – mainly from the fields of critical social sciences and critical futures scholarship – that we deem most important for addressing the study's main objective. The literatures we explored engage with important concepts regarding transformations, such as justice, plurality, and power. We have presented the ongoing work several times at conferences, for feedback, and a near-final version of this report was peer reviewed (internally and externally).

Conceptualising transformative change necessitates thinking about the future. Thus, we also build on a rich tradition of (critical) futures scholarship and foresight/scenario studies, aimed at exploring both possible and desirable futures. Evidently, we delve into the different ways in which transformations have been conceptualised already, acknowledging the pivotal role of power dynamics in hampering or driving such transformative change. Additionally, to ensure the development of just transformation pathways, we need to explore the different ways in which (in)justice can be conceptualised and consider how it manifests itself in practice. Linked to this, we also need to be aware and inclusive of the plurality of stakeholder perspectives, knowledge, imaginaries, values, and stakes.

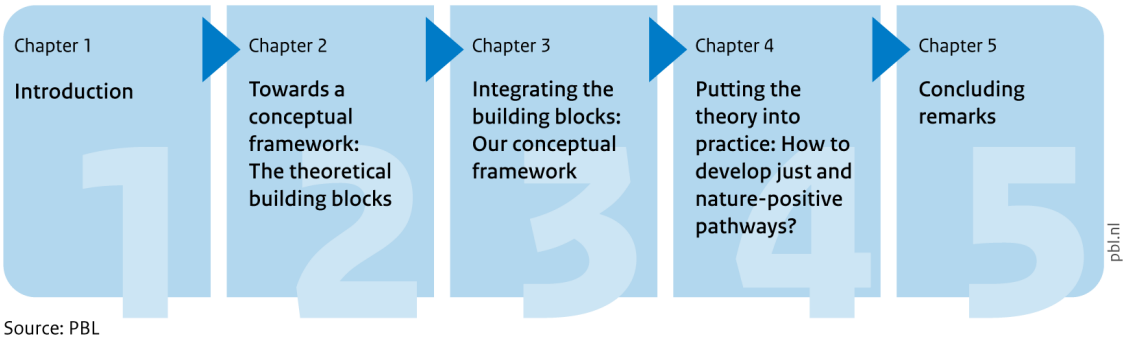
This study serves as a stand-alone resource, which, we hope, will inspire other efforts aimed at developing just and nature-positive scenarios. It is also the basis for our next project phase, in which we aim to support the development of just and transformative pathways towards nature-positive futures in different project within PBL's research programme on International Nature Policy that explores ways to achieve the GBF goals and targets (see Box 2).

Outline of this report

We will proceed as follows (see also Figure 3): Chapter 2 introduces the main conceptual 'building blocks' based on our focused literature study. Then, we integrate these building blocks into our conceptual framework in Chapter 3, followed by guidance on how to develop just and nature-positive pathways in Chapter 4. We end this report with some concluding remarks in Chapter 5.

Figure 3

Overview of this report: Pathways towards just and nature-postive futures



Source: PBL

2 Towards a conceptual framework for just and nature-positive futures: The building blocks

This chapter unpacks and elaborates on the conceptual components, or building blocks, that we deem essential for developing *pathways towards just and nature-positive futures*. Together, these building blocks comprise our conceptual guiding framework (which is introduced in Chapter 3). We first delve into these three main building blocks: *pathways*, for which we provide an overview of the relevant concepts from the futures studies and foresight literature, zooming in on scenarios and visioning (2.1). We then turn to the concept of *justice* and describe the different ways in which it can be defined, and how we operationalise it for the purpose of this study (2.2). Finally, we delve into what '*nature-positive*' entails (2.3).

We then turn to two additional building blocks we deem equally important: we outline what *transformative change* means and what it implies for just, nature-positive futures, acknowledging the pivotal role power dynamics play (2.4). We then discuss the importance of understanding the role of *plural perspectives*, imaginaries, knowledge systems, and values of nature in just, transformative change towards a nature-positive future (2.5).

2.1 Pathways towards visions of the future

A forward-looking approach to governance is essential for dealing with complexity and uncertainty

Addressing the intertwined environmental crises the world is facing means that we have to make sense of the complexity around us. From a systems perspective, our world is comprised of complex adaptive systems – i.e. the interconnected social, technological, and ecosystems, or *social-ecological-technological systems (SETS)* (McPhearson et al. 2022) – which are characterised by uncertainty, emergent properties, path dependencies, and thresholds (Levin 1999). As a result, the consequences of policy actions are often ambiguous and unpredictable, which creates a strong imperative to consider the longer term. Moreover, addressing 'long problems that span generations', such as climate change and the biodiversity crisis, often proves highly challenging, as many of the impacts of such problems as well as the effects of policy measures aimed at tackling them will only be felt in the longer term. Many of our institutions are not fit to effectively deal with such timeframes yet, and need to adopt an anticipating and forward-looking approach to governance that leads to forward-looking, compelling policy goals (Hale 2024). Therefore, exploring and navigating this complex and uncertain world calls for a futures-oriented mode of decision-making.

Futures studies and foresight

Futures studies encompass all research exploring possible, plausible, desirable, and pluralist futures (in plural, as it refers to the multitude of possible futures), as well as research into how people engage with the future (Mangnus et al. 2021; Rutting et al. 2022). Future-oriented or forward-looking approaches and methods are commonly referred to as foresight, which can be defined as any method of thinking about the future with the aim of guiding decisions in the present (Saritas et al. 2022; Wiebe et al. 2018). The first formalised forms of foresight emerged in the early 1900s, applied in military contexts as 'war games' (Wiebe et al. 2018). Half a century later, the application of foresight spread to the fields of business, environmental science, and beyond. Different forms were developed aimed at engaging with diverse societal challenges. Foresight studies are considered to be part of the extended field of futures studies. Foresight includes a wide variety of future oriented methods (including predictive studies, horizon scanning, and explorative scenario studies). As this report focuses on *pathways* towards just and nature-positive futures, we concentrate on scenarios here.

Explorative scenarios

Perhaps the most widely used form of foresight is scenario planning, which refers to the imagination and exploration of different plausible future scenarios, often with the aim to guide decision-making. In this regard, scenarios are defined as 'representations of the future to facilitate thinking about the possible consequences of different events or courses of action within a systematic foresight exercise' (Wiebe et al. 2018). Scenario processes are often organised as participatory sessions involving multiple stakeholders (Wiebe et al. 2018) and are commonly referred to as *explorative* scenarios, as they explore a range of possible or plausible futures. One specific type of explorative scenarios, referred to as policy-screening scenarios, can be applied as a tool for ex-ante assessments of policies in different contexts (IPBES 2016). Explorative scenario studies aim to address future uncertainty by exploring multiple, different plausible future trajectories. This can foster thinking about contextual (i.e. external drivers of change) and societal change, going beyond baseline scenarios and extrapolations of current trends. Policies, plans, strategies, or investments can be made more robust and feasible across a range of hypothetical futures through 'pre-testing' them in the context of these different futures, guided by the central question: *what could happen in the future?*

Normative scenarios or visioning

By contrast, normative scenario approaches – also known as target-/goal-seeking scenarios or solution-oriented scenarios or visioning approaches (IPBES 2016) – are about desirable futures, or *visions*, and focus on the question: *what future do we want?* Oftentimes, visioning is applied in combination with *backcasting*. Such combined visioning-and-backcasting approaches start with the development of a future vision and, subsequently, steps that need to be taken to achieve that vision are defined through reasoning backwards from the future to the present. This, in turn, can help guide the articulation of policy scenarios (Börjeson et al. 2006; Dreborg 1996). Such scenarios connect the present with some kind of normative future (whether it be visions, goals or targets) and are often called *pathways* (Foxon et al. 2013).

Visioning approaches potentially allow for perceiving the future as fundamentally pluralistic and political, and for acknowledging the plurality of perspectives in society (Mangnus et al. 2019; Muiderman et al. 2020). Foresight approaches highlighting plausible and desirable futures exist next to each other and can be complementary: visioning approaches can help articulate policy pathways,

and subsequently, the robustness of these policy pathways can be tested using an explorative scenario approach.

As this study focuses on how to develop just pathways toward global biodiversity goals, it supports the development of *normative, solution-oriented* or *target-seeking* scenarios. In addition, it aims to explore challenges to achieving just, nature-positive futures, and as such, our approach is also, in part, *explorative*.

Box 3: Recognising the politics of imagining futures
It is important to note that, for a long time, the majority of futures scholarship and practitioners' work tended to be rather instrumental, rooted in a utilitarian tradition, favouring practices such as modelling and quantitative forms of scenario planning that are 'directly linked to specific decision-making prospects or strategic situations' (Ahlqvist and Rhisiart 2015). Oftentimes, (participatory) scenario processes are conducted with the objective of informing the formulation of policies, plans, or other governance proposals without paying attention to the politics of collectively imagining futures – these include differences in perspectives and agendas among actors, as well as the power dynamics between these actors. Recent decades have, however, seen a rise in studies critically examining the supposedly apolitical and neutral nature of futures work (Ahlqvist and Rhisiart 2015; Bengston et al. 2012; Godhe and Goode 2018). It is now acknowledged that being open to new, alternative visions instead of primarily focusing on the continuity of present pathways and trends, can widen debates to include new ways of achieving sustainable futures (Bai et al. 2016). Combining the utilitarian dimension of foresight that is rooted in the quantitative natural sciences with a more 'emancipatory' dimension informed by the social sciences and humanities, could improve political reflexivity in futures studies (Ahlqvist and Rhisiart 2015). In doing so, futures thinking can help to go beyond what is considered the 'norm', and explorations of futures could allow for interrogating widely held beliefs and values, and to make explicit societal taboos (Schoemaker and Tetlock 2012).

2.2 Understanding *justice*

What do we mean by justice?
Justice is a complex, inherently moral, and therefore often contested concept. Fundamentally, justice pertains to what we deem right or wrong, and to the norms and values guiding how benefits and burdens should be shared, how decisions should be made, and whose ways of knowing and living should be respected (Fraser 2005; Schlosberg 2007).

Justice is not only an aspirational goal but also an analytical lens and a set of processes for examining how social and environmental outcomes are produced, whose interests are prioritised, and how change unfolds – historically, in the present, and (what is desirable) in the future (Beretta and Bracchi 2023; Kortetmäki 2017). Additionally, justice concerns the mechanisms, relationships, and institutional arrangements through which decisions are made and impacts arise. As such, justice also encompasses a process shaping how (environmental) problems are defined, whose perspectives are included, and how decisions are negotiated over time (Avelino et al. 2024).

There are many different understandings and interpretations of the concept, some of which overlap and others which conflict, which can lead to tensions between these understandings. Typically, scholars concerned with the topic in relation to environmental concerns use a tripartite

model to make sense of the different interconnected dimensions of justice. This model distinguishes between three dimensions: distributive, procedural, and recognitional justice (Avelino et al. 2024; Oates and Verveld 2024; Schlosberg 2007). Some argue that this model has its limitations; in response, many additional dimensions of justice have been suggested in the literature (Wijsman et al. 2026), one of them being restorative justice (Avelino et al. 2024; Oates and Verveld 2024; Schlosberg 2007). Nowadays, restorative justice is frequently added as a fourth dimension that attempts to better account for temporal and relational forms of justice, acknowledging how historical injustices have shaped environmental degradation and highlighting the need to repair harm done to communities and ecosystems (Bluwstein 2021; Koot et al. 2024; van Megen and Anthony 2024).

These dimensions of justice can be applied across different domains – such as climate, environmental, or social justice – and to different subjects – such as nature, specific social groups, or future generations (see Figure 4; Oates and Verveld 2024). Together, these perspectives help to clarify *what kind of justice is at stake*, *for whom or what*, and *through which means it might be sought*.

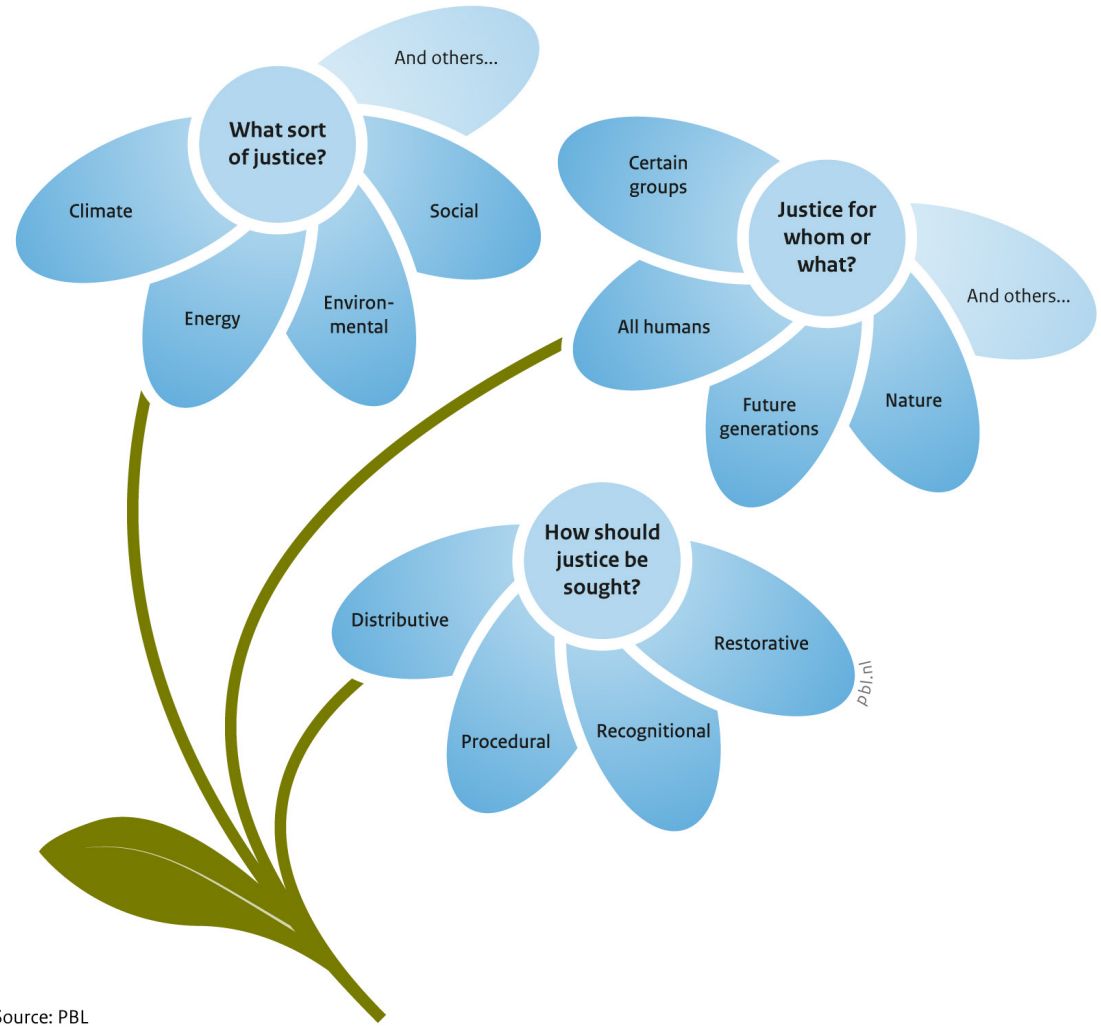
In the context of nature-positive futures and pathways, these justice dimensions might prompt us to consider several questions:

- Distributive justice concerns how the benefits and burdens of conservation, restoration, and land-use change are allocated (Moore 2012). For example: Who gains or loses access to land, resources, or ecosystem services when areas are protected or restored? Who bears the costs of restoring degraded ecosystems, and who gains from enhanced biodiversity or other ecosystem services like carbon sequestration?
- Procedural justice focuses on whose voices, knowledge systems, and priorities shape the visions and pathways toward nature-positive futures (Ruano-Chamorro et al. 2022). It asks whether affected communities, especially those historically marginalised or dispossessed, have real influence over conservation decisions, restoration strategies, and the governance of natural resources. It increasingly also concerns the procedural rights of nature itself (Schapper et al. 2022).
- Recognitional justice draws attention to the need to acknowledge and equally value different cultural, spiritual, relational, and place-based understandings of nature (Martin et al. 2016). It shows how dominant ideals of conservation can actually lead to the *mis*recognition of alternative practices. This is particularly relevant in a global context where Indigenous and local communities hold worldviews and stewardship practices that may differ from conventional environmental models.
- Restorative justice highlights the need to recognise and repair historical and ongoing injustices that underpin many ecological transformations (Tuteur 2022). Nature-positive futures often require acknowledging past land dispossession, extractive relationships with ecosystems, and colonial conservation model – as well as taking steps to repair these harms.

Taken together, these dimensions show that what counts as a 'nature-positive' pathway is not only an ecological or technical question, but also a profoundly social, political, and moral one. What a just, nature-positive future could look like, or how transitions are designed and governed, can either (re-)produce existing injustices or contribute to more equitable and sustainable futures.

Figure 4

Questions to ask about justice in sustainability transitions



Source: PBL

A 'just' future: Justice in relation to sustainability and transitions

Debates about the justice dimensions of sustainability transitions have a relatively long history. The notion of just transitions was first coined in the 1970s, when labourers in the United States united in defence of their rights against the negative impacts of the first environmental policies and regulations (Stevis and Felli 2020). The efforts that emerged in these times highlighted that environmental action could have unevenly distributed social consequences, an issue that remains central to this day. At the same time, the concept of environmental justice gained visibility in US sustainability debates, commonly associated with the 1980s mobilisation against toxic waste and pollution that disproportionately affected low-income communities and communities of colour (Bullard 2001; Bullard and Johnson, 2000; Bullard and Wright, 1990; McCauley and Heffron, 2018)..

Even if they manifested on a large scale in the 1970s and 1980s, these struggles for environmental justice have a much longer history. Globally, Indigenous peoples and local grassroots groups have long resisted environmental harms, land dispossession, extractive industries, and exclusion from environmental governance. These efforts predate both the formal naming of 'environmental

justice' and the rise of 'just transitions' in policy arenas but form the foundations upon which longer histories of resistance are built (Álvarez and Coolsaet, 2020; Koot et al. 2024).

While originally centred on the unequal distribution of negative environmental impacts, just transitions debates have gradually expanded to include issues such as 'autonomy, self-determination, access to resources, fairness and justice, and civil and human rights' (Agyeman et al. 2016). These concerns remain deeply relevant to contemporary sustainability transitions, which seek not only technical or ecological improvements, but also profound shifts in how societies understand, relate to, and take responsibility for nature and the ecosystems on which they depend (Pickering et al. 2022). From a justice perspective, sustainability transitions and transformations in and between society and nature involve shifts in power, access, control, and meanings. This raises questions about who sets the agenda for change, whose futures are prioritised, who benefits from new 'green' opportunities, and who bears the social or ecological costs (Turnhout 2024). Research has found that transitions framed as moving towards nature-positive futures can reinforce existing inequalities (Tebboth et al. 2025), for example through conservation-related displacement (Agrawal and Redford 2009) or green grabbing (Fairhead et al. 2012; Gargallo et al. 2022). There are also examples of how such transitions can help redress existing injustices, for example through community-led restoration (Oates et al. 2024; Tedesco et al. 2023) and the recognition of Indigenous stewardship, which applies in a wide variety of geographical settings (Haluska 2023; Mafongoya and Ajayi 2017). Understanding justice in this dynamic, relational way is therefore considered increasingly essential for guiding transitions toward futures that are both nature-positive and socially just and legitimate.

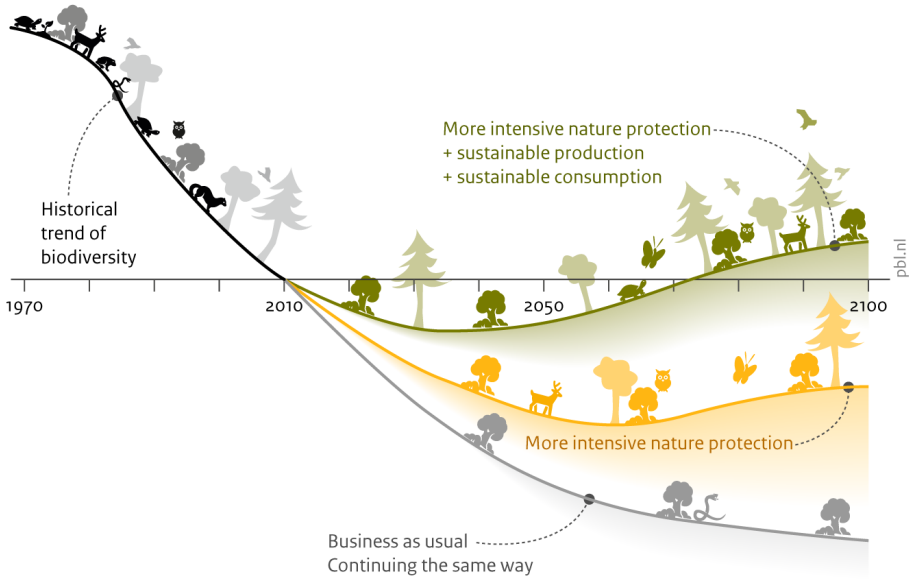
2.3 Defining and operationalising '*nature-positive*'

The origins of 'nature-positive'

The concept of *nature-positive* was introduced in response to the need for a clear objective to guide biodiversity action and policy. In the run-up to the 2020 Conference of the Parties (COP-15) to the Convention on Biological Diversity (CBD) in Kunming, China – the term 'nature-positive' was introduced as a motto that would work inspiring and action-spurring. It would function analogous to the 'carbon-neutral' and 'net-zero' objectives of the 2015 Paris Climate Agreement (Lambertini et al. 2025). An ambitious objective, nature-positive refers to both halting *and* reversing the loss of nature and biodiversity, resulting in *more* nature (Locke et al. 2021), also described as 'bending the curve' of biodiversity loss (Leclère et al. 2020; see Figure 5). The formal formulation of the nature-positive objective is to 'halt and reverse biodiversity loss by 2030 on a 2020 baseline, and achieve full recovery by 2050' (Lambertini et al. 2025). Nature-positive can therefore be considered the overarching ambition of the Kunming-Montreal Global Biodiversity Framework (CBD 2022; Kok et al. 2022).

Figure 5

Recovery biodiversity of land nature according to social-cultural images of nature maintenance



Source: IPBES; Leclère et al. 2020

An important feature of the nature-positive goal is that it strives for a *net* positive outcome. Human use of and pressures on ecosystems and biodiversity will not disappear; to a certain degree, these will always continue to impact nature (Lambertini et al. 2025). The *net* positive concept acknowledges this and allows for considerations of justice: different stakeholders have different perceptions of their right to use nature's services and resources. For example, poor subsistence farmers may claim their right to cut down forest for crop production in order to feed themselves and earn a decent living (Taherzadeh et al. 2026).

Inevitably, different positions regarding the concept of nature-positive have emerged over time. On the one hand, some regard it as a practical and operational concept for pursuing nature-inclusive business agendas, and point to its compatibility with legal frameworks. Furthermore, it is viewed as a useful boundary object that can facilitate discussions, negotiations and policy action (Stenseke et al. 2025). On the other hand, there are more critical voices who point at the risk of the concept distracting from actually addressing the structural drivers of biodiversity loss (Stenseke et al. 2025). Furthermore, the concept has been critiqued for its vagueness and the resulting potential for greenwashing (Maron et al. 2023). Some also argue that there is a need for indicators that reflect the plurality of dimensions such as values of biodiversity and nature more generally, moving 'beyond narrow, carbon-like metrics' (Stenseke et al. 2025). Questions as to who benefits from particular operationalisations of nature-positive are important from a justice and equity perspective: are the burdens of moving in a nature-positive direction equally shared?

This study aims to contribute to imagining nature-positive futures, while recognising the pitfalls of the concept of nature-positive. We also acknowledge that there is a plurality of ways to 'bend the curve' – we aim to explore a plurality of pathways, in which questions around justice and equity need to be addressed as well.

Box 3: Three potential opportunities for non-state actors to pursue a nature-positive future

In addition to government policies across governance levels (a '*whole-of-government*' approach), contributions by non-state actors play a pivotal role in halting and reversing biodiversity loss. This is what the CBD calls a '*whole-of-society*' approach (Kok et al. 2022). The past few years have seen an increase in efforts to address biodiversity loss by non-state actors at regional and local levels, e.g. by cities, NGOs, private sector actors, and Indigenous communities. However, for such an approach to be effective, government policies need to be aligned with and supportive towards local and regional initiatives. In this regard, Kok et al. (2022) identified three specific constellations of societal actors and nature as representing important leverage points for transformative change towards a just and nature-positive future: cities; businesses and the financial sector; and rural landscapes. Of course, these three constellations of actors overlap, as cities are situated in landscapes and businesses are key actors in both cities and wider landscapes. Nevertheless, these three actor configurations represent promising, complementary avenues for transformative change, as collectively they cover important parts of society that need and do take action to conserve and restore nature and address direct and indirect driver of biodiversity loss.

The first configuration centres on cities, as they represent critical spaces and actors for biodiversity action (Kok et al. 2022). Cities and urban stakeholders increasingly recognise nature-based solutions as important ways to effectively deal with the consequences of climate change, declining biodiversity, and public health issues. This is at odds with the – up to now – dominant mode of urban planning that is still very much focused on 'grey' infrastructure such as roads. Transforming cities towards becoming nature-positive therefore implies shifts in urban infrastructure regimes. At the same time, while urbanisation is predominantly perceived as a threat to biodiversity, actors in cities are already contributing to trajectories towards a nature-positive future, addressing direct and indirect drivers of biodiversity loss (Bulkeley et al. 2021; Veerkamp et al. 2023). As cities are increasingly turning into active agents in global sustainability governance efforts, organised in networks and initiatives like the International Council for Local Environmental Initiatives (ICLEI) and CitiesWithNature, they are becoming important players in the international biodiversity governance arena (Kipar et al. 2026).

Secondly, the potential contributions of businesses and the financial sector present a promising leverage point for transformative change. In the wake of the launch of the GBF, many companies have taken up nature-positive as part of their Environmental, Social, and Governance (ESG) agendas. Realising the *double materiality* issue nature represents, both in terms of impacts and dependencies, some companies have developed nature-positive strategies to avoid risks and assess impacts and dependencies (Van Oorschot et al. 2020). A key message of the IPBES business and biodiversity assessment is that businesses both depend on and impact biodiversity and can be agents of positive change (IPBES 2026). In addition, transformative change towards a nature-positive future requires a 'whole-of-society' approach based on collective action, as well as fundamental changes in current business models (Kok et al. 2022; Van Oorschot et al. 2020).

A third potential avenue for transformative change concentrates on rural landscapes, where a multitude of actors, sectors, ecosystems, stakes, and political agendas meet (Meijer et al. 2021). Rural landscapes are home to a range of vital ecosystems and biodiversity hotspots, while also functioning as the main areas for food production. As such, they represent contested spaces where multiple actor groups operate, and where nature conservation, agriculture, forestry, tourism, and other forms of land use co-exist and compete. This is why landscapes are being recognised as highly relevant spatial units for the implementation of biodiversity and other sustainability-related agendas. Meanwhile, landscape-level actors are already engaging in efforts for nature-positive development. It is important to pay attention to the power dynamics between local needs and visions from external parties who aim to use that landscape, possibly at the expense of local actors. This means that inclusive platforms for inter-stakeholder dialogue alone do not suffice (Kok et al. 2022).

2.4 Transformations

As stated in the introduction to this report, achieving the GBF goals and targets will require transformative change. We focus on just and nature-positive pathways as a way to explore transformative change towards the GBF goals. But what do we mean when we talk about transformations? The terms transition and transformation are often used interchangeably. Moreover, the concepts are often loosely defined, which risks voiding them of meaning. It is therefore important that we clearly define what we mean when using these terms.

2.4.1 What are transformations?

Transitions and transformations have been defined in various ways. While both terms refer to change in complex adaptive systems, they tend to be used for different scale contexts. Whereas *transition* analyses typically (but not always) concern societal sub-systems such as energy, mobility, or cities, the term *transformation* generally pertains to more fundamental, long-term, and large-scale societal shifts which can play out on local, national, and/or global levels, involving interacting human and biophysical systems (Hölscher et al. 2018). This definition of transformation is in line with how IPBES defines *transformative change*: 'A fundamental, system-wide reorganisation across technological, economic and social factors, including paradigms, goals and values' (IPBES 2018). There is consensus among scholars that the terms *transformations* and *transformative change* adequately capture the degree of change that is needed to address the global biodiversity challenge (Visseren-Hamakers et al. 2022). For example, Termeer (2017; Termeer and Dewulf 2019) prefers 'to speak of a transformation rather than a transition, to indicate that we are talking about a profound and unpredictable system change'. In this study, we therefore use the terms transformation and transformative change (except where other terms are used in quotes or specific labels such as 'just transition').

In the context of sustainability, transformations mainly refer to desirable change towards desirable future worlds. It is therefore important to acknowledge that transformations are inherently normative, and the processes shaping them are deeply political, often characterised by power struggles and conflicts (Patterson et al. 2017).

Academic definitions of transformation differ in how they conceptualise systems, whether they consider transformations as deliberate or emergent processes of change, and in terms of outcome (prescriptive vs. descriptive) (Feola 2015). Conceptualisations also greatly differ in terms of scale and scope, as exemplified by the terms 'transformational adaptation', which refers to forms of reactive change in demarcated settings, and 'societal transformation', which pertains to a fundamental, society-wide form of change that involves rethinking and redesigning how social-ecological systems function (O'Brien and Barnett 2013). Furthermore Termeer et al. (2024) distinguish three dimensions of transformative change: *depth* (from superficially improving current practices to 'altering underlying assumptions' and radically changing 'existing practices by altering values, frames, and logics underlying the current system'), *scope* (from small to system-wide), and *pace* (from quick and abrupt to more long-term change). These three dimensions, Termeer et al. argue, cannot be pursued simultaneously to the same extent, because there are important trade-offs between them (Termeer et al. 2024).

In addition, we can distinguish three key 'distinct but overlapping approaches to understanding and advancing transformations': structural, systemic and enabling approaches (Scoones et al. 2020).

Structural approaches focus on changes in the underlying foundations of politics, the economy, and society. For transformations to unfold, key moments or conjunctures, such as tensions between actors or crises, are crucial: this is when movements advocating change may emerge across civil society (e.g. degrowth). Structural approaches tend to focus on desired 'rules of the game', i.e. the deeper layers of society consisting of culture, traditions, values, and beliefs. By contrast, systemic approaches emphasise the features of systems as the targets for change. Examples of such lenses include social-ecological systems studies, focusing on the interplay between innovation, learning and adaptability, and socio-technical system approaches that look at different system components (such as technology, infrastructure, financial rules or regulations) and distinguish between niche, regime, and landscape levels. Systemic approaches tend to focus on managing system dynamics. Lastly, enabling approaches highlight the transformative potential in society, e.g. in social movements, bottom-up niches and the like in concert with more structural (often governmental) forces, and, as such, take a more optimistic and emancipatory stance, putting less emphasis on the role of control in processes of transformation. As mentioned above, these approaches are not mutually exclusive, but should instead be seen as complementary lenses for understanding, analysing, and trying to bring about real-world transformative change (Scoones et al. 2020). This begs the question how (a combination of) structural, systemic, and enabling approaches can amount to transformative change toward reaching the GBF goals.

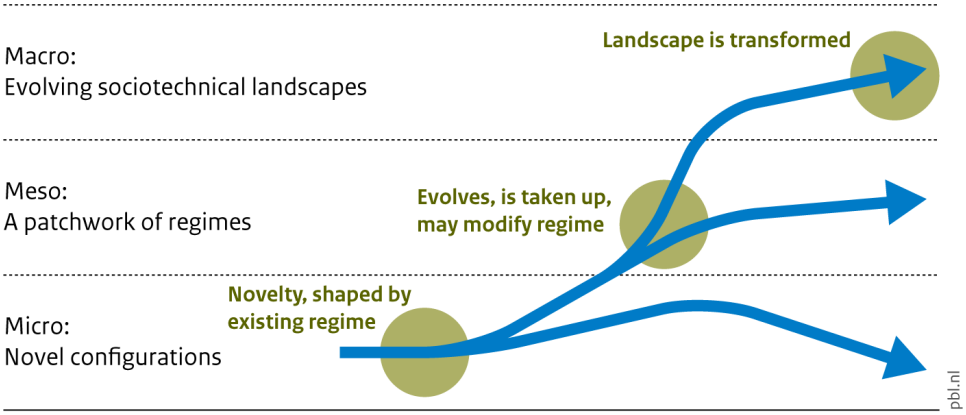
It is important to remind ourselves that transformations are about deep and enduring change that addresses the challenges and crises we face today (Bentz et al. 2022). According to Vogel and O'Brien (2022), transformative change should be simultaneously *transdisciplinary* (incorporating a multitude of knowledge sources and perspectives), *transgressive* (recognising power asymmetries and challenging/disrupting the status quo to claim space for alternative visions), and *transcending* beyond the usual conceptual understanding of systems change. The latter is possible by thinking about new ways of perceiving the world spurred by a particular transformative idea that is being implemented. For example, when implementing the idea of 'Doughnut Economics' (Raworth 2017), this would mean to also think about the new ideas, practices, and policies this could inspire (Vogel and O'Brien 2022).

2.4.2 Governing for transformations

Transformations require a system-wide approach to shifting societies towards sustainability. This raises the question of how to govern for transformations. Different analytical frameworks aimed at making sense of the complexity of transformations and at guiding governance have emerged over the past few decades. Here, we describe a number of such frameworks. Particularly influential is the multi-level perspective (MLP), developed for conceptualising (socio-technical) transitions (Rip and Kemp 1998). Following the typology of Scoones et al. (2020), the MLP can be considered a systemic approach. It distinguishes between three levels: the macro-level or landscape, the meso-level or patchwork of regimes, and the micro-level, where novel configurations or niches emerge. Simply put, the logic behind this analytical framework is that niches at the micro-level, which represent alternatives to current regimes, can gain momentum and eventually become part of a new regime. This, in turn, may then change the landscape (Geels 2002; Rip and Kemp 1998; see Figure 6).

Figure 6

The multi-level perspective

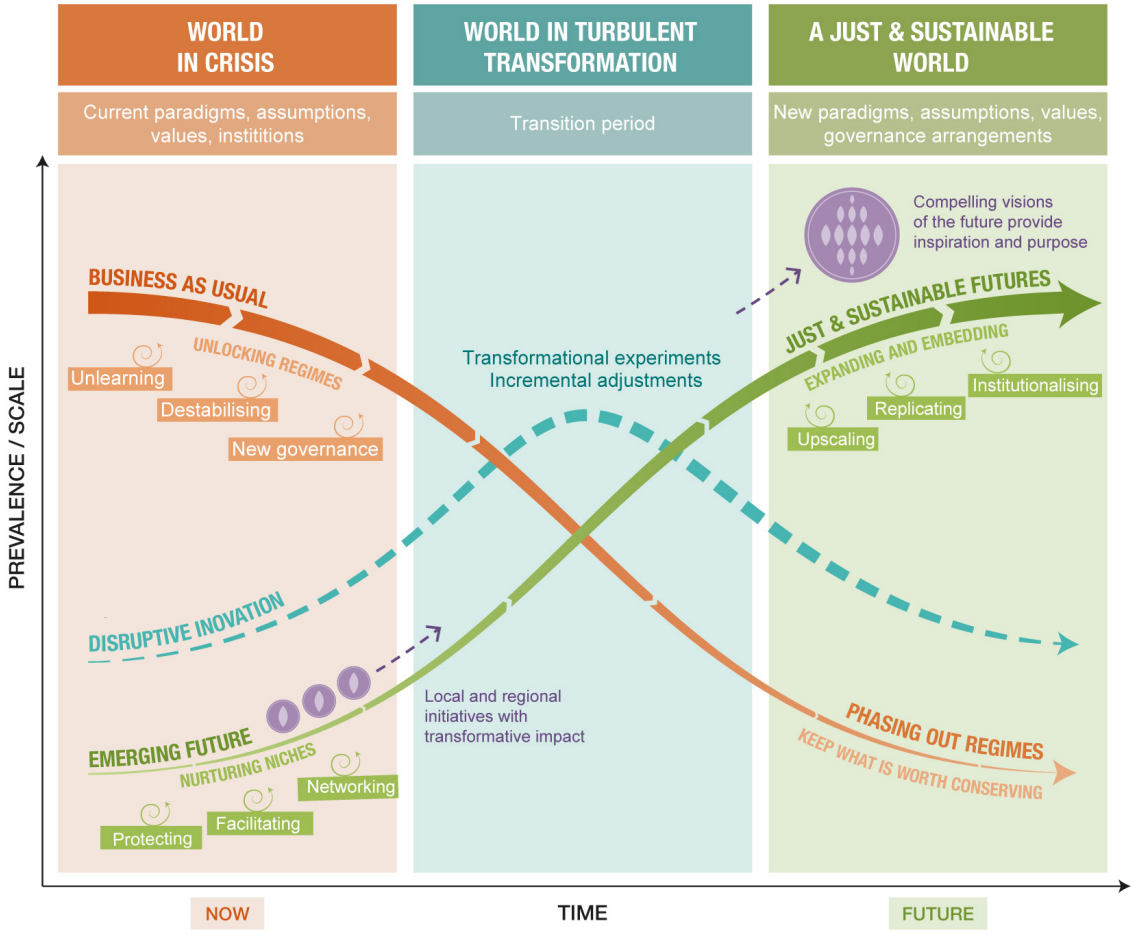


Source: Rip and Kemp 1998

A related and widely used heuristic tool for conceptualising how transformative change may unfold is the x-curve (Hebinck et al. 2022; Loorbach et al. 2017). This tool shows how the simultaneous destabilisation of regime structures and acceleration of niche innovations can result in a functional space of conflict and chaos, providing fertile ground for new regimes to emerge. Although both frameworks are highly simplified depictions of the complex and often messy processes that characterise real-world transformative change, they can be valuable tools for guiding thinking around governing for transformations as they help to 'structure' these complex dynamics. The IPBES Transformative Change Assessment includes an updated version of the x-curve tailored to biodiversity governance, which emphasises the turbulent period of transformative change (Bennett et al. 2025; see Figure 7).

Figure 7

Compelling, shared visions of the future can provide inspiration and purpose that can promote transformative change by questioning and disrupting the views, structures and practices that sustain business-as-usual, while expanding on those that can shape a sustainable and just future.



Source: Taken from Bennet et al. 2025

Principles for transformative governance

The IPBES Transformative Change Assessment recently proposed five key strategies to deal with the biodiversity challenges we are facing: 1. sustainable stewardship of places with high value to nature and people, driven local communities and Indigenous people if and where appropriate; 2. fostering transformative change in sectors that have most impact on biodiversity loss; 3. transformation of dominant economic systems to benefit nature and advance equity; 4. transformation of governance systems to make them more inclusive, adaptive, integrated and accountable; and 5. try to shift societal views and values on the interconnections between humans and nature. In addition, to realise these strategies, co-creation of knowledge should be a cross-cutting strategy, focusing on and assuring the principles of plurality and inclusion (IPBES 2024).

A growing body of work argues that transformative change toward a nature-positive future requires a new *eco-social* contract (Huntjens 2021; Huntjens et al. 2025; Huntjens and Kemp 2022; IPBES 2024; UNRISD 2022): a reconfiguration of societal agreements and governance arrangements that define how rights, responsibilities, and benefits are distributed among citizens, institutions, markets, and the nature. Such a contract seeks to address the anthropocentric and extractive

foundations of current economic and societal systems that drive ecological degradation and social inequality (Huntjens and Kemp 2022). Similarly, the IPBES states in their assessment that 'true transformation' only occurs when shifts take place at the level of views, structures, and practices at the same time (IPBES 2024).

The trade-offs of transformations

Different transformation scholars argue that it is important to acknowledge the potential risks and trade-offs of pursuing transformative change (e.g. Blythe et al. 2018; Westley and McGowan 2017). Crucially, there is a risk of paying insufficient attention to power and politics, which both play chief roles in the complex and often messy and contested ways in which transformative change unfolds (Westley and McGowan 2017). This can lead to unequal outcomes. It is important, therefore, to be aware of the potential 'winners and losers' in transition processes: different actors will experience different pain, struggles, losses, and costs in different phases of a transition process (IPBES 2024). Here, 'ethics of care' or 'relations of care' are useful concepts to consider (IPBES 2024). Ethics or relations of care, i.e. the acts of care by people and/or nature, are to be recognised as collective and reciprocal, not just altruistic or unidirectional. In that sense, these ethics of care can be seen as part of the preservation and regeneration of ecosystems in which people and non-human nature are interdependent (Puig de la Bellacasa 2017). Moreover, Blythe et al. (2018) argue that the burdens of transformations should not be shifted to vulnerable groups in society. And in addition, there is a risk of co-optation of transformational discourse – actors who are aligned with current unsustainable regimes may use it to justify business-as-usual developments and protect vested interests, thereby hampering transformative change (Blythe et al. 2018). And finally, much of the transformation literature does not pay attention to people's psychological needs and emotions. People may have emotional responses to transformative change and the required phase-outs of current practices, structures and associated elements of cultures, i.e. they may experience 'transition pain' (Bogner et al. 2024).

Governing for transformations is challenging

Governing for transformations is no easy feat. Different actor groups are likely to disagree on how transformations should unfold, i.e. they advocate different transformation pathways based on different values, policy instruments, innovations and interpretations of justice, to name a few. Moreover, the influence of actors who benefit from and uphold the current system and are therefore the most likely to resist transformative change, is often overlooked. A key challenge, therefore, lies in making transformation appealing to actors aligned with current systems: how can the influence of actors that benefit from and uphold unsustainable systems be effectively reduced or redirected (Huntjens et al. 2025)? An interesting approach to address this involves pursuing 'small wins' (Termeer and Dewulf 2019): incremental changes that are likely to be met with less resistance than more fundamental reforms, which can be perceived as imposed change. Yet these incremental 'small wins' could be strategically combined with deeper efforts to shift underlying paradigms, values, and institutional structures that shape current systems and future trajectories (Huntjens et al. 2025).

2.4.3 The role of power in transformations

Different types of power

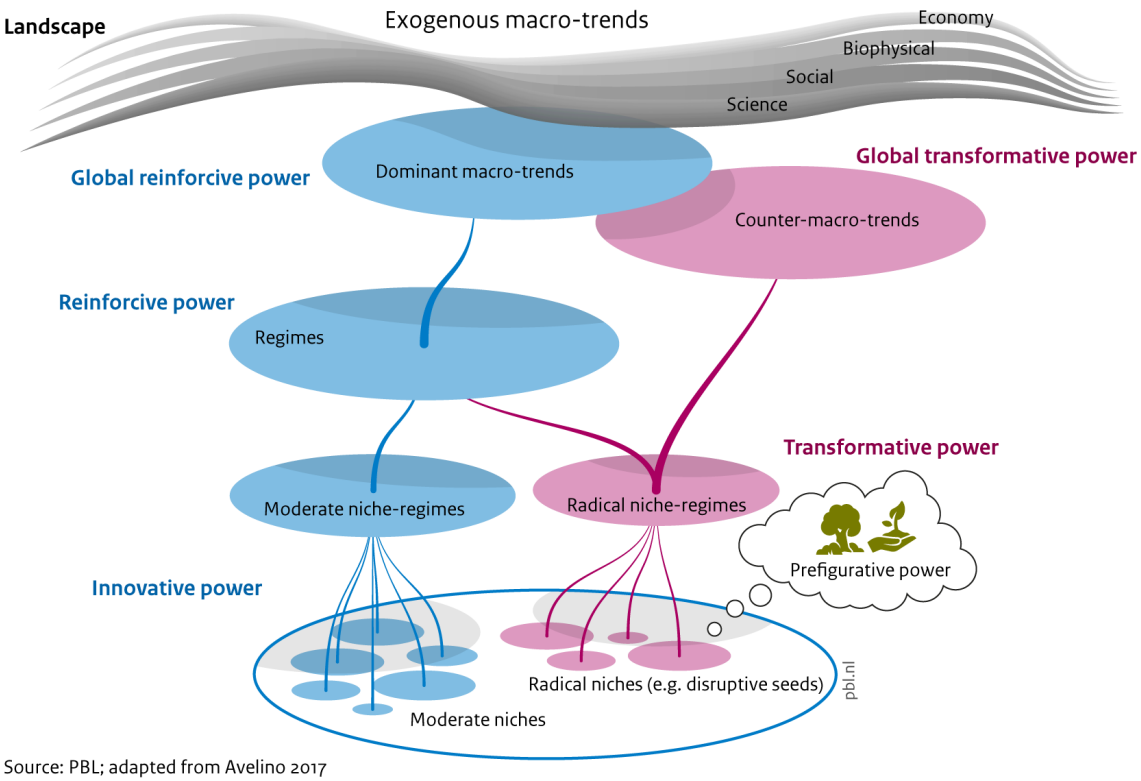
Power plays a pivotal role in societal change, and equally so in transformations. To discuss how power affects the transformation towards a just and nature-positive future, we first need to examine what power, in relation to governance, actually constitutes. Most studies into power treat the concept as referring to a type of social relation, with two main recurring conceptualisations: 1. The power of actor A over actor B; and 2. The power of actor A or B to mobilise resources towards achieving a certain goal (Pansardi 2012; Parsons 1963). Both these conceptualisations can be considered aspects of social power (Pansardi 2012), and both are particularly relevant when engaging with transformative change. More recently, a third type of power relation that is often overseen has been distinguished: the fact that A and B can exercise *different* types of power, both to and over (Avelino 2017). It is important to note that these types of power can coincide, though they do not necessarily have to. For example, while a certain actor A might have more power *to* mobilise resources than actor B, this does not automatically mean that actor A has power *over* actor B.

Power in transformations

Transformations inevitably involve shifts in power relations. The earlier introduced multi-level perspective (e.g. Geels 2005; Rip and Kemp 1998) on transformational change, which distinguishes between change at the landscape level, regime level, and niche level, implicitly acknowledges this. Different actor groups in society may have conflicting goals and interests, and may be aligned with incumbent systems that are currently dominant (*regimes*), or with parts of society that are involved in alternatives to current regimes, ranging from innovative technologies to alternatives to the current ways in which society is organized (*niches*) (e.g. Avelino 2017). The *landscape* can be defined as anything exogenous to the system under study, i.e. the regime and niche actors considered part of said system (Geels and Schot 2010; Avelino 2017). The landscape can be understood as a combination of true exogenous macro-trends, such as climate change and trends that emerge from human intervention but are outside of the system of study. These 'endogenous' macro-trends can be either aligned with the regime, so-called *dominant* macro-trends, or with niches, as so-called *counter*-macro-trends. Oftentimes, actors associated with the current regime have power over niche actors, and actors differ in terms of their power to mobilise resources.

Figure 8

Multi-level perspective and power in transformations



Source: PBL; adapted from Avelino 2017

Despite these conceptualisations of power dynamics, some critics argue that much of the earlier scholarship focusing on governing for transitions/transformations tends to underestimate the roles of power, political resistance, and vested interests in resisting change (Lawhon and Murphy 2012). In the context of transformations, then, it is useful to concentrate on 'the nature of the power exercise in relation to stability and change' (Avelino 2017). Transformative change entails both challenging existing power structures and creating alternative institutional arrangements that enable more just and sustainable futures (Huntjens et al. 2025). The power to create something new is qualitatively different from the power to maintain what already exists. It is therefore relevant to distinguish between types of power, including reinforcive, innovative, and transformative power. Figure 8 provides a useful conceptualisation of how the interplay between these different forms of power at different levels plays a crucial role in transformative change (Avelino 2017). For example, regimes exert reinforcive power to maintain themselves, which includes the structural power of institutions, the discursive power that frames what is considered legitimate, and the instrumental power of economic and political elites (Avelino 2017; Huntjens et al. 2025). A crucial part of this reinforcive power, closely related to discursive power, is the *dramaturgy* of the regime, i.e. what roles people play to be 'believable' in the science-policy interface, or how to be 'policy-relevant' (Hajer and Oomen 2025). Niches, on the other hand, can utilise innovative power. When niches gain momentum, they become 'niche-regimes' (de Haan and Rotmans 2011), which can be defined as niches that have 'grown powerful enough to gain a number of new characteristics, most important of which is the ability to attack (sometimes effectively) an incumbent regime (and therefore to potentially take over from it)' (Grin et al. 2011). Such niche-regimes use transformative or countervailing power to challenge and change the regime and dominant systems (De Geus et al. 2023).

The power of both regimes and niches can be further enhanced by trends at the macro-level, that can be either reinforcive (enhancing the regime) or transformative (enhancing niches). A crucial insight is that power can also be exercised through the construction of knowledge, or through mobilising mental resources (Avelino and Rotmans 2009). Recent studies have further conceptualised the notion of prefigurative power (Avelino et al. 2024; Monticelli 2022; Wittmayer et al. 2022). Here, prefiguration refers to the act of embodying alternative futures. This goes beyond just imagining futures; it is about living them, about new ways of doing, thinking, and organising (Wittmayer et al. 2022). One example of prefiguration is the experimentation of postcapitalist alternatives to current economies by the degrowth movement (Avelino et al. 2024). Prefigurative power can inspire larger-scale action and change, for example through mobilising new funding (Vervoort et al. 2025).

Bottom-up transformative power

Over the past decade, a line of research has emerged that (implicitly) focuses on the transformative power of niche initiatives, or seeds. This concept was first introduced as Seeds of Good Anthropocenes (SoGA), in response to the observation that current policy discussions tend to focus on dystopian visions (Bennett et al. 2016). However, the world is actually full of 'bright spots' or *seeds* that can inspire positive change and foster hopeful future visions. Such seeds can be defined as 'initiatives (social, technological, economic, or social–ecological ways of thinking or doing) that exist, at least in prototype form, but are not currently dominant in the world' (Bennett et al. 2016). Examples of seeds include agroecological forms of agriculture, and the enshrinement of the Right of Nature in law as a legal entity, for instance through human representation. Seeds potentially have both prefigurative and transformative/countervailing power.

Rutting et al. (2023) updated the seeds approach, responding to the lack of explicit attention to the role of power in transformative change, as informed by scholarship on power in transformations (Avelino 2017; Brisbois 2019; Feola et al. 2021; van Rijnsoever and Leendertse 2020). This updated approach, called *Disruptive Seeds*, includes a set of guiding questions around the power of seeds and regimes which foster thinking about the fundamental role of power dynamics in transformations. Disruptive seeds are seeds of transformative change that 'have the potential to grow in impact through actively challenging (or disrupting) currently dominant but unsustainable, incumbent systems and associated actors' (Rutting et al. 2023). Examples of such disruptive seeds include forms of regenerative farming that actively challenge the current agricultural regime dominated by big agribusinesses, and governance of social-ecological systems by local communities who advocate for sovereignty, land reform and social justice (such as the Zapatista movement in Chiapas, Mexico) (Rutting et al. 2023).

Paying attention to power dynamics is crucial

It is clear that power dynamics play a crucial role in transformative change, as powerful actors aligned with current regimes are likely to resist such change through the exercise of reinforcive power. Power manifests itself in multiple ways, from direct political and financial power, to more indirect ways, including through discourse and value orientations (which we will discuss further in section 2.5).

Given the current global landscape, in which powerful actors tend to pursue future visions that are not always aligned with international goals needed for reversing biodiversity loss, it is pivotal to explore how power dynamics may change and how (power) shifts from current unsustainable systems to new ones that contribute to just and nature-positive futures. In this vein, what kinds of

futures can we envision? One way to investigate future power dynamics is to explore how international partnerships form strategic alliances to combat climate change and biodiversity loss in pathways. In addition, it is pivotal to assess how can bottom-up, nature-positive initiatives, or transformative seeds, confront current unsustainable and unjust regimes, and how they contribute to pathways towards nature-positive futures in the process.

2.5 Plural perspectives on just and nature-positive futures

Plurality is very important in the development of pathways for transformative change towards just nature-positive futures. Different (groups of) people perceive and understand the world in different ways and, consequently, they have fundamentally different perspectives on and understandings of the future. One could argue that different people not merely comprehend a certain 'shared reality' differently, but they actually experience distinct present realities, reflect on different versions of the past, and, as a result, envision different futures as well (Vervoort et al. 2015). However, this plurality of ways in which people perceive the world is structurally overlooked in governance (de Pater 2025), which can lead to inequalities and hamper (bottom-up) innovation (IPBES 2024).

A stance of embracing plurality, or *pluralism,* 'means recognising and legitimising diverse ways of being, knowing, perceiving and relating to the world of both human and other-than-human actors' (de Pater 2025). Highlighting diverse knowledge systems, imaginaries, value orientations, and human-nature relations can help disrupt current, unsustainable trajectories (IPBES, 2019), empower marginalised groups such as ethnic minorities, immigrants, LGBTQIA+ individuals, low-income communities, youth, local communities and Indigenous peoples – the latter not least because of their extensive knowledge regarding sustainable co-existence with natural ecosystems. Including the ideas, knowledge, and perceptions of a wider variety of actors and stakeholders, groups, and individuals provides fertile ground for new ideas and solutions, and can help make the science-policy interface better equipped to deal with complexity and uncertainty (de Pater 2025).

In this section, we therefore scrutinise the different ways in which plurality plays a role in shaping desirable futures. Actors differ in terms of their *perspectives* (2.5.1), which are shaped by different *knowledge systems* (2.5.2), worldviews, and social *imaginaries* (2.5.3). On an individual level, people hold beliefs and values, so in 2.5.4 we delve into the plurality of *values of nature* in particular.

2.5.1 Perspectives

For effective governance towards a just and nature-positive future, it is crucial to acknowledge that that different groups in society have different perspectives and understandings of what that could look like. Having different perspectives on the world, being informed by different knowledge systems, and imagining their societal embeddedness differently (i.e. 'living' in different *imaginaries*, which will be explained further in 2.5.3), people have different relationships with nature and different views of the world they are part of (Brugnach and Ingram 2012; Dewulf et al. 2004; Helfgott 2018; Herrera 2017). As a consequence, people frame the problems they – and the social-ecological systems they are part of – face in distinct ways, too. What one actor perceives as a problem, might be seen differently or not perceived as a problem at all by another (Midgley et al. 1998; Ulrich and Reynolds 2020). This can lead to tensions and conflicts between actors, and to the marginalisation of actor groups, especially when powerful actors define governance systems in

such a way that certain actor groups are excluded from policy discussions (Dewulf et al. 2009; Midgley et al. 1998; Shepherd and Bowler 1997). Moreover, generally accepted notions of what is real and attainable for nature-positive futures, often rooted in Eurocentric worldviews, science, and imaginaries, in fact rule out radically alternative conceptions of the future, thereby (often unintentionally) regarding them as impossibilities (Escobar 2020). This limits the range of solutions, innovations, and alternatives to current practices needed for transformative change (IPBES 2024). Social movements (e.g. in Latin America) have mobilised a form of politics that acknowledges the pluriverse, this being a world that consists of many coexisting worlds, each with its own ontological and epistemic underpinnings. They embody this notion in order to explore a wider range of culture- and context-specific possible solutions to planetary crises, such as the loss of nature (Escobar 2020). This opens up a whole spectrum of possibilities for scholars, policymakers, and others on how to deal with these challenges.

2.5.2 Knowledge systems

It is important, for a variety of reasons, to pay attention to the different knowledge traditions for forward-looking governance. First of all, taking into account different knowledge traditions increases the legitimacy of a futures exercise (Glucker et al. 2013; Stirling 1999). Secondly, knowledge from non-academic stakeholders, ranging from local and Indigenous communities to practitioners in different contexts, can complement, challenge, open up, and/or offer new or alternative understandings of nature society and social-ecological systems (Cornell et al. 2013), or increase our current understanding thereof (Stirling 1999). Moreover, it is important to realise that dominant knowledge systems, which currently tend to (implicitly) privilege the interests of powerful societal groups, are often reproduced and refined without sufficiently engaging with alternatives, such as those proposed by post-colonial and feminist theories (Castro-Gómez 2005; Joseph Aboi 2024; Wijsman and Feagan 2019). Adopting a reflexive stance towards knowledge encourages researchers and policymakers alike to critically examine their own epistemological assumptions, shaped by their education, lived experience, and the epistemic communities to which they belong (Yanow 2009). Furthermore, post-colonial, (eco-)feminist, and other-than-human perspectives can shift how we frame specific issues. For example, Kyle Whyte (2017) reframed the vulnerability of Indigenous peoples to the effects of climate change as a consequence of 'intensified colonialism' (Whyte 2017), and Vandana Shiva (1992) wrote about the dismissal of diversity in agriculture through capitalist models of progress, leading to monoculture and uniformity (Shiva 1992).

Against this backdrop, it becomes important to consider the epistemological underpinnings of futures thinking in policy and science, such as foresight, especially in the context of governance of social-ecological systems. Much of the foresight work practiced today remains anchored in predictive models aimed at risk reduction or in scenarios that navigate uncertainty through plausibility thinking (Muiderman et al. 2020). More broadly, environmental challenges are still predominantly approached through technocratic frameworks grounded in the natural sciences. This often sidelines the crucial contributions of the social sciences, which are vital for understanding the political and human dimensions of environmental crises (Cologna and Oreskes 2022; Glavovic et al. 2022; Hackmann et al. 2014; Turnhout and Lahsen 2022). For example, as argued in the IPBES Transformative Change Assessment (and in Chapter 1 of this report), it is important to address both direct drivers such as land use change, exploitation and climate change, *and* indirect drivers and underlying causes of biodiversity loss – the last two including demographic, sociocultural, economic and political drivers, and thus, need to be addressed through social science-based analyses (IPBES 2025). Therefore, transformative change is also needed *within*

knowledge systems, one could argue. Decentring dominant knowledge regimes and embracing plural epistemologies could thus be essential steps toward more inclusive, just, and impactful governance for just and nature-positive futures.

2.5.3 Imaginaries

On a societal level, people have shared understandings of the social whole, in that they collectively imagine their social existence. These deep and sometimes taken-for-granted images of the present and future play a crucial role in both present-day societies and collective ideas about the future (Castoriadis 1987; Jasanoff and Kim 2013; Taylor 2004). Imaginaries can be *performative*, in that they can have effects on present-day decision-making (Oomen et al. 2022). Moreover, they influence our value orientations on a societal level, thereby partially shaping our individual worldviews and values as well (see also 2.5.4) (Taylor 2004). Imaginaries are defined in various ways, but for this study, Manjana Milkoreit's interpretation is particularly useful, as it focuses on both humans and non-humans (e.g. rights of nature): 'Collectively held visions of the future that include the natural environment, possibly even as an agent rather than a mere object or context' (Milkoreit 2017). It is important to understand that visions of the futures imagined in participatory processes largely stem from such widely held imaginaries, reflecting the oft-hidden politics and framings.

Multiple imaginaries are co-existent in society, although certain imaginaries – notably hegemonic, technocratic imaginaries around neoliberal or sustainable growth – often dominate and override other imaginaries. Regardless, other imaginaries may offer alternative, and sometimes fundamentally different views on the relation between people and nature, such as the Buen Vivir imaginary from South America, the Ubuntu imaginary in Africa, or the degrowth imaginary that emerged in recent decades (e.g. Escobar 2011; Feldman and Biggs 2012; Rutting et al. 2024b). The societal imaginaries that are dominant have a significant impact on the transformative imagination of individuals. They naturalise certain worldviews (Hartman et al. 2005), and thereby, to a great extent, 'limit and distort collective imagination' (Dey and Mason 2018), and provide and enact 'the grounds of possibility for transformation' (Pigott 2018). However, the power dynamics between the plural imaginaries that co-exist in societies are rarely perceived or recognised as such (Bourdieu 1991; Jasanoff and Kim 2019; Miller and Wyborn 2020). Claiming space for alternative and marginalised knowledge traditions, imaginaries, and worldviews can enrich the conceptualisation of transformations in a way that truly opens up pathways towards social equity and justice in a nature-positive future. In order to overcome such constraints of our collective imagination beyond dominant imaginaries, society would need to mobilise reflexivity, inventiveness, and alternative ideas (Dey and Mason 2018).

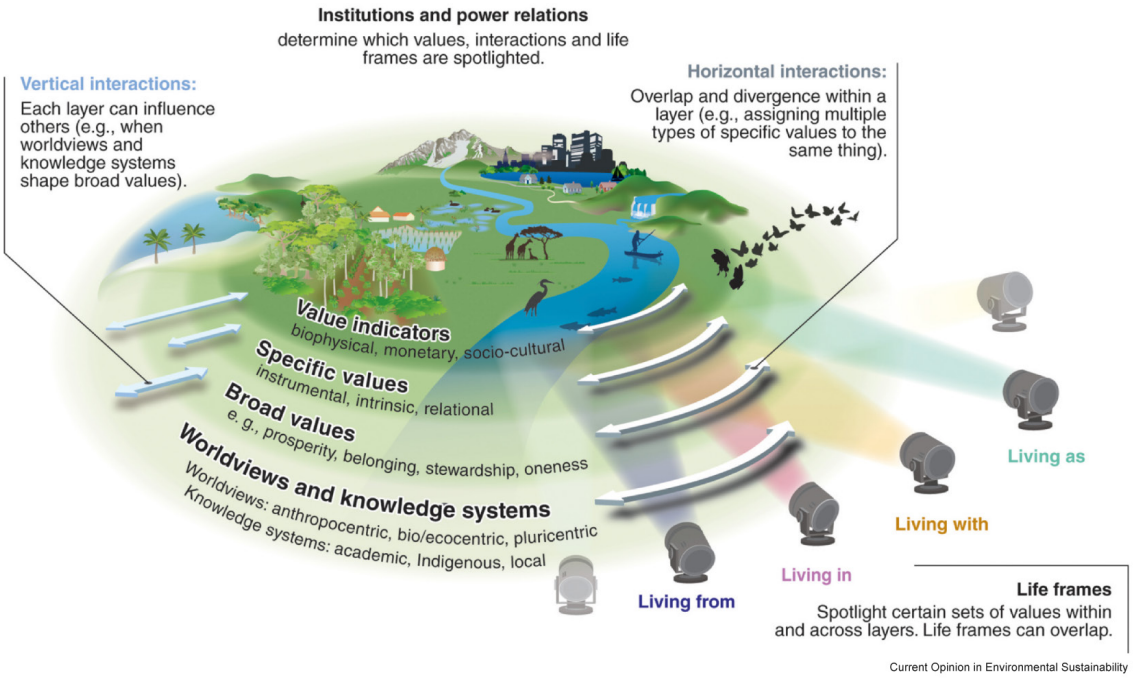
Crucially, Waddock (2025) argues that we need new imaginaries to replace currently dominant ones in order to catalyse transformations. She argues that eco-social imaginaries based on equity, inclusiveness (also of non-human nature), and relationality could help with finding ways of living in harmony with Planet Earth (Waddock 2025). Emerging eco-social imaginaries, such as regenerative perspectives and eco-social contracts, offer alternative ways of conceptualising relationships between society, economy, and the more-than-human world (Buckton et al. 2023; Huntjens et al. 2025).

2.5.4 Values of nature

Considering the above, we can conclude that people also perceive, experience, and interact with *nature* in many ways and therefore value nature differently. This leads to different understandings of the role that nature plays in their lives and how it contributes to their quality of life (IPBES 2022). The ways in which this occurs are themselves influenced by different, interacting layers of beliefs, practices, norms, and principles. These include societal imaginaries, worldviews, broadly-held values, norms, and principles, as well as specific values of nature (IPBES 2022; Raymond et al. 2023; see Figure 9). Values, in this sense, can be described as principles or core beliefs 'underpinning rules and moral judgements'. It follows, then, that 'values as principles vary from one culture to another and also between individuals and groups' (Pereira et al. 2020). Significantly, these values shape the ways in which people perceive, interpret, and express 'reality', and, by extension, nature (Berger and Luckmann 1989; Goodman 1978; Latour 2004), which, arguably, cannot 'be established in absolute terms' (Bendor et al. 2017).

Figure 9

An inclusive typology of the diverse values of nature. Four conceptual value layers can be distinguished: I) worldviews and knowledge systems, II) broad values, III) specific values and IV) value indicators. Four non-mutually exclusive life frames are depicted here: the grey, unlabelled spotlights represent other possible framings of people-nature relationships. Different value types are exemplified within a given layer.



Source: Taken from Raymond et al. 2023

On another, more abstract level, nature is also inextricably connected to the worldviews people hold, both as individuals and as a society or social group. These are closely related to societal imaginaries (see section 2.5.3) and knowledge systems (see section 2.5.2). At a deeper and more concrete level are our broad values, linked to norms, principles, and practices (IPBES 2022). The broader values people hold can either strengthen or conflict with their values of and care for nature.

The so-called specific values of nature are frequently discussed in the literature and are commonly categorised as relational, intrinsic, and instrumental values (see Himes et al. 2024; and Chapter 4 of this document on the Nature Futures Framework). These specific values express how we perceive nature in a particular instance and context. For example, individuals can hold multiple specific values simultaneously – the different categories of these specific values are intended to reflect diversity while acknowledging overlap. An even more specific expression of the value of nature is found in the indicators we use to discuss, measure, or represent these values (e.g. through symbols, rituals, data, and models).

The values people hold regarding nature are a major reason why envisioned futures of nature can look so different. As it stands, existing policies aimed at addressing biodiversity loss often overlook the plurality of values people hold for nature and instead tend to prioritise a narrower perspective (IPBES 2022; van Dam et al. 2024). To ensure sustainable and just futures, it is therefore pivotal to recognise this plurality and the fact that values of nature differ both between and within societies and cultures (Díaz et al. 2015; IPBES 2022). Different perceptions of nature may be incompatible, and the values of certain actors may dominate decision-making processes at the expense of others (IPBES 2022; Pascual et al. 2017). Though sometimes inevitable, it is important to acknowledge this nonetheless.

In research, and in conversations about values of nature within foresight processes and policies for nature-positive futures, it is crucial to understand how people relate to the world and, consequently, to nature. We need to ask ourselves whether people see themselves as fully part of nature, and if not how distinct they perceive themselves to be from nature, or how they relate to 'other-than-human' species, for instance. At the same time, it is important to note that by ontologically separating people from nature, we may position ourselves as hierarchically superior, thereby justifying its use, or conserving biodiversity in ways that restrict human access. This may result in unsustainable or unjust consequences for nature (including people) through the commodification of ecosystems and the perpetuation of institutional power structures and marginalised voices rooted in global hegemonies (Álvarez and Coolsaet 2020).

Understanding how people relate to nature is key to grasping how people value nature and interact with it, which in turn is essential for effective policy development and implementation. Recognising the distinct values people hold regarding nature helps to describe different human–nature relationships, interactions, and visions for a nature-positive future, and to govern and guide efforts towards such futures.

3 Integrating the building blocks: Our conceptual framework for just and nature-positive futures

In the preceding chapter, we introduced the 'building blocks' of our conceptual framework. In this third chapter, we build on this structure and describe the interlinkages between the various building blocks and what they can mean for developing transformative pathways towards a nature positive future. To reiterate, the main building blocks of our framework, as introduced in Chapter 2, are pathways, justice, nature-positive, transformations (including power), and plurality (including imaginaries and values of nature). The question at the foundation of this third chapter, then, is how do these concepts relate to each other? As outlined in the introduction, the concept of justice is the principal building block as it is both overarching and cross-cutting in our framework. We therefore start this chapter with an elaborate account of the different operationalisations of justice relevant to this study (3.1). We then continue by exploring how these applications of justice relate to the other building blocks and introduce a visual mapping of our conceptual framework (3.2).

3.1 Justice in nature future scenarios

Taking the broad conceptual commonalities introduced in section 2.2 and Figure 4 as starting points, we can discern various operationalisations of justice for nature futures work, all of which are relevant to this study. In scenario work, justice becomes not only a desirable attribute of nature-positive pathways, but also a guiding principle for how those pathways are envisioned, negotiated, and assessed. We frame justice in four complementary ways that will be tested for their utility in collectively iterating towards more just and nature-positive futures.

3.1.1 Justice as an ambition

The Global Biodiversity Framework (GBF) has the ambition to ensure that pathways towards nature-positive futures deliver fair and equitable outcomes for both people and nature. This approach sets justice as a normative goal for pathway design. If we strive for a more just future, what would a fair distribution of benefits and burdens look like across communities, regions, and generations? In practice, this could mean considering the following questions when developing or evaluating scenarios:

- How are the benefits and burdens of nature conservation and restoration, land-use change, and ecological transitions distributed, now and in the future?
- Which communities gain or lose access to land, nature's contributions to people, or financial support?
- How are impacts shared across regions and generations, how are past harms acknowledged or repaired, and how are future harms prevented?

What counts as 'just' can vary widely across contexts and according to individuals, as based on different perspectives and lived experiences. Operationalising just outcomes therefore requires a

plural approach that recognises different interpretations of fairness, responsibility, and reciprocity with nature.

3.1.2 Justice as an analytical framework

Here, we develop the concept of justice into an analytical framework through which to analyse designed futures. Different dimensions of justice (such as those introduced in Chapter 2) can be translated into more practical and operational variables that allow us to develop analytical categories and questions that we use to reflect on scenarios. By using justice as a lens to examine the power dynamics, trade-offs, and structural inequities embedded in nature-positive visions, this approach helps scenario teams identify where certain actors, species, or ecosystems may be systematically advantaged or disadvantaged by different pathways, and where tensions arise between biodiversity goals and social rights. In practice, this involves translating the dimensions of justice into operational questions, such as:

- Whose future does this scenario primarily reflect?
- Which value systems, knowledge traditions, or place-based relations with nature were included or excluded?
- Who wins or loses under different conservation or restoration strategies?

This use of justice does not assume that scenarios themselves must be 'just', but rather provides a structured way to diagnose injustices, reveal blind spots, and identify opportunities for improvement towards 'more just' nature futures.

3.1.3 Justice as a tool for legitimacy

Pathways are more likely to be considered legitimate if developed in ways that build trust, foster participation, and enhance credibility and acceptance among diverse stakeholders. Nature futures often have far-reaching implications for, among others, land rights, resource use, and cultural practices, making legitimacy crucial for their feasibility. When building scenarios, justice can function as a bridging principle by helping to build acceptance and collective ownership among diverse actors, thereby making the pathways more socially and politically credible (Martens et al. 2023). This, in turn, increases the likelihood that resulting policy actions are effective. Applying justice in this way helps:

- To clarify competing claims around land, nature, and access;
- To support meaningful engagement with stakeholders, including those that are often overlooked, such as Indigenous peoples, local communities, and other marginalised groups, capturing a wide range of perspectives that contribute to scenario creation and knowledge production processes more broadly;
- To strengthen shared ownership of pathways across contexts.

In scenario development for policymaking, this means explicitly asking the following question: *How can processes and resulting visions be made more legitimate, trusted, and resonant for those who will live with their consequences?*

3.1.4 Justice as a tool for reflexivity in research

Finally, justice considerations can be embedded into the research and scenario-building process itself. This involves the continuous reflection on assumptions, positionality, and biases in the design of nature-positive futures. Reflexivity enables teams to challenge entrenched framings – such as the prioritisation of certain forms of nature, certain governance models, or certain visions of progress – and to consider how alternative perspectives might reorient pathway design. It prompts researchers and practitioners to ask:

- What assumptions about nature, value, or human–nature relations underpin this scenario?
- How does our positionality influence what futures we consider possible or desirable?
- Which worldviews or knowledge systems are being centred, and which are being marginalised?

Iterative reflexivity of all involved in the process of building scenarios for nature futures can help reduce blind spots, identify harms before they materialise, and build trust among diverse actors. This requires deliberate attention and specific capacities from those involved (which is discussed further in Section 4.2).

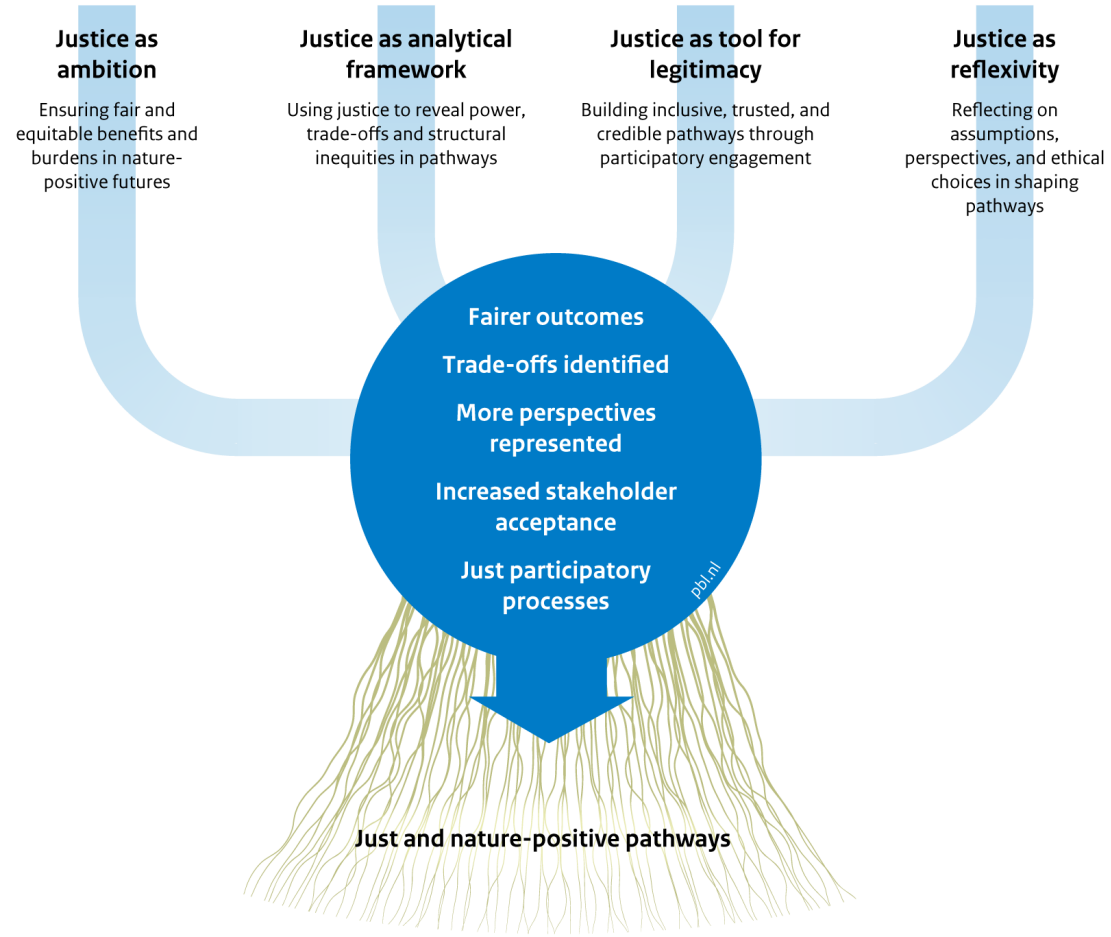
3.1.5 Four functions of justice for nature-positive futures

Together, these four functions – justice as ambition, as an analytical framework, as a tool for social and political legitimacy, and as a tool for reflexivity in research – make justice a foundational principle for imagining, assessing, and co-creating nature-positive futures (see Figure 10). Justice therefore becomes a practical tool for shaping how nature futures are envisioned, who is involved in creating them, and how impacts are evaluated, with the aim of designing transformative pathways that are inclusive, credible, and socially grounded and thus work for people and nature.

While recognising that differing perspectives on fairness will always arise, pursuing just futures is in line with the goals and targets of the GBF and other global policy frameworks (function 1). Iterating towards such futures is possible by applying justice as an analytical lens (function 2) and embedding justice principles through reflexive research practices (function 4). Doing so helps identify trade-offs, reduce blind spots, and build trust among diverse social and political actors, thereby strengthening the legitimacy and relevance of nature-positive pathways (function 3). Together, these functions will provide the foundation for both the conceptual framework presented in this report and the co-creation of the scenario-based pathways – as such, justice stands central to the development of transformative, nature-positive futures (we elaborate on the operationalisation of these four approaches in Chapter 4).

Figure 10

Four-pronged approach to operationalising justice in scenarios



Source: PBL

3.2 Connecting the building blocks

We use our framework to conceptualise how transformative change may unfold by drawing on the building blocks introduced in Chapter 2. This framework shows how transformative change can emerge from (the interplay between) different actors at regime and niche levels. Actions by both regime- and niche-level actors are guided and shaped by (a plurality of) values of nature, which are both shaping and being shaped by worldviews, and by societal imaginaries and knowledge systems. These may overlap, complement, or conflict with each other, which then influences the ways in which transformative change then takes form. Our world is a highly heterogeneous and pluriform place, and, as a consequence, transformative change is likely to emerge in different ways in different places, as well as at different levels of governance. Dominant knowledge systems, imaginaries, and value orientations, as aligned with current regimes, play a crucial role in a regime's exercise of reinforcive power, while alternative imaginaries and sources of knowledge, as well as associated value orientations, help niches/seeds to exercise transformative, prefigurative, and disruptive power. When just and nature-positive niches gain ground and offer appealing alternatives to an unjust or unsustainable regime, or successfully challenge and disrupt the dominance of a regime, power shifts may take place that lead to transformative change, i.e. a

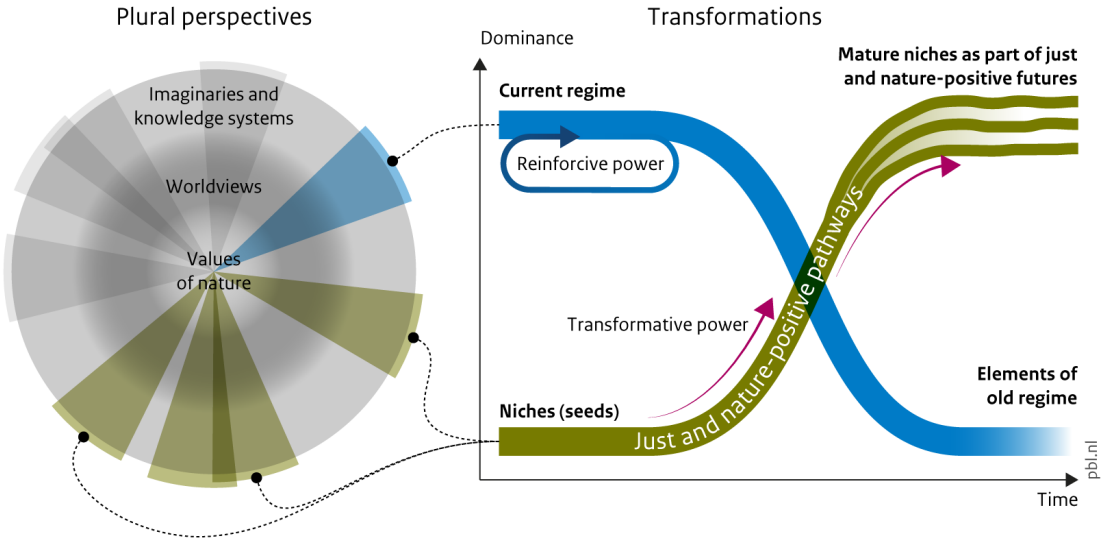
transformative pathway towards a more just and nature-positive future. This is where justice as an *ambition* (and, thus, as an *outcome* of transformative change) is relevant.

To visualise how these conceptual building blocks relate to each other, we draw on both the different iterations of the x-curve (see Figure 7 in 2.4.2) and the values typology of the IPBES Values Assessment (see Figure 9 in 2.5.4). We visualise this together in Figure 11, below, in which the right half shows how transformative change may unfold as a result of power dynamics between regimes and niches, which are shaped by different values of nature, worldviews, societal imaginaries and knowledge systems, depicted in the left half of the figure.

All the while, during the development of pathways, it is important to try to involve a wide range of stakeholders, most importantly those representing alternative or marginalised voices, thus using justice as a *tool for political legitimacy*. In addition, both conveners/organisers of and participating stakeholders in pathways development practices are advised to use justice as a *tool for reflexivity*, through reflecting on and interrogating their assumptions, values, perspectives, and worldviews, and being cognizant of the societal imaginaries that impact these. After such pathways are developed, the concept of justice can be used for an ex post *analysis* of how power dynamics and transformative change impact the ways in which different forms of justice manifest themselves in the pathways.

Figure 11

Integrating the conceptual building blocks



Source: PBL

4 How to develop just and nature-positive pathways?

This chapter provides practical guidance on how to develop just and nature-positive pathways. Even if this report is intended for all interested parties, this specific chapter specifically caters to the interests of conveners, designers, and facilitators of pathways development processes. It does so in three ways. First, this chapter describes what is important to consider upfront (4.1), e.g. to be reflexive of one's own positionality. Second, it gives direction on how to prepare and organise the process of participatory, deliberative pathway development (4.2). Finally, it provides set of concrete tools and methods that can be used in the process of developing pathways, i.e. for the content of the scenario narratives (4.3).

4.1 What to consider upfront?

When considering organising a pathway development process, it is important to be reflexive of one's own assumptions and background. This begins with acknowledging one's positionality and the potential advantages and privileges stemming from it. Furthermore, it is important to be aware of and reflect on the assumptions that underlie one's understandings and interpretations of a just, participatory process. One question to ask, for example, is whether there are any biases that may arise from your background.

Developing pathways is inherently political

Practices of foresight, or futures thinking such as participatory scenario planning, bring together diverse actors, each with their own worldview and values, to engage in a process of collectively imagining futures. Such collective imagination has the potential to foster meaningful and constructive dialogue. However, dominant imaginaries and worldviews in present-day society and associated interests are often equally dominant in such imagined futures, which does not do justice to the plurality of worldviews that are present in a specific local context and in society at large. This dominance tends to marginalise the rich diversity of perspectives that actually exist. When envisioning futures, participants inevitably (consciously or unconsciously) project their own beliefs, values, and interests onto those visions. As such, participatory foresight is inherently political. This political dimension can lead to tensions among stakeholders or, worse, to the exclusion of perspectives from less powerful groups. Nevertheless, these tensions often go unacknowledged because, as mentioned above, foresight is widely perceived as a technocratic, objective, and value-free tool for addressing uncertainty and exploring different plausible futures. In other words, foresight is often characterised as depoliticised in its practice (Louis and Maertens 2021), while simultaneously being shaped by various assumptions and methodological choices. It is therefore typically framed as 'scientific', and thus 'neutral' and 'apolitical'. We further elaborate on how to be reflexive towards these politics as a facilitator during the pathways developing process in 4.3.

Think about the potential tensions between global and lower-level pathways upfront

It is important to note that there is a field of tension between global pathways and meaningful regional and local-level scenarios. Additionally, the question arises on how to develop global pathways in a participatory way, while striving to do justice to the complexity and diversity of the world and the ideas and values people hold. A potential way to accommodate this tension is

through working with case studies representing or illustrating different global regions through local contexts. When focusing on just and nature-positive pathways for cities, for example, one could select cities as case studies which represent diverse global regions or archetypes in terms of size, structure, degree of homogeneity of its population, or other characteristics. Global pathways can subsequently be developed with, for example, representatives from these different city case studies. This way, the granularity, and thus the relevancy to local and regional actors of those global pathways, could be increased.

4.2 Preparing and organising participatory pathway development processes

Organising a participatory pathway development process starts with identifying stakeholders following principles of inclusive participation, ensuring the representation of all those stakeholders (e.g. Few et al. 2007; Smith 2012). However, as we have outlined in this report, organisers of such processes have to be mindful of a number of important aspects. First of all, they have to be reflexive regarding the question who needs to be included. As described in section 2.5.1, people, often unknowingly, define systems in such a way that certain groups are included while others are excluded (Midgley et al. 1998; Ulrich and Reynolds 2020). The majority of participatory futures processes tend to be limited in terms of the width of participation. Generally, such processes mainly involve experts and professionals, and when involving the wider public, they often fail to empower participants due to a lack of agency and ownership of the process (Barendregt et al. 2024; Laurell Thorslund et al. 2025). Organisers therefore have to reflect upfront on their own assumptions regarding the system or case they focus on and ask themselves, are we not overlooking certain stakeholder groups?

In addition, organisers have to be aware of the power dynamics and (im)balances between involved stakeholders. We therefore recommend to assess the power relations between participants upfront, for example by using a simple tool such as the power-interest grid (e.g. Mitchell et al. 1997), which can help to identify the power of stakeholders relative to each other. Factors such as type of organisation, age, gender, and cultural background can all play a role in the power relations between stakeholders. Depending on the specific context, this also differs per situation. One way to accommodate these differences in a workshop setting is to work with breakout groups consisting of individuals from similar groups, which can help to create a 'safe space' for individuals to speak out. A disadvantage of this approach is the potential decrease in stakeholder diversity per breakout group.

If time and resources allow, a promising way to ensure broad, inclusive participation is through citizen deliberation, or *deliberative public/citizen engagement* (Devaney et al. 2020; Hurlbert 2023; Macnaghten 2021). Deliberative public engagement is a way of involving citizens in decision-making and knowledge production processes more directly. Through engaging them in the process from an early stage and allowing for in-depth consideration and discussions in a structured way, complex issues characterised by uncertainty and contestation (such as the climate and biodiversity crises) can be addressed in a more effective and just way. Moreover, broad public engagement can contribute to stakeholder buy-in, and to more robust decision-making (Hurlbert 2023). In addition to adding diverse perspectives and knowledge to discussions around transformative pathways, such citizen deliberations have demonstrated to help with addressing justice concerns in ways that

align with citizens' expectations and interests (Huttunen et al. 2025). Deliberative public engagement can be organised in different ways[1].

Mobilise the arts to open up imagination of transformative pathways

We want to recommend organisers of participatory pathway development processes to engage with arts-based methods in some way. Arts and creative practices offer powerful ways to open up the range of futures that are imagined in such processes (see e.g. van Lente and Peters 2022). For instance, co-production efforts for sustainable futures between artists and academics, such as applied storytelling and socially engaged arts, can help to engage with diverse future possibilities, opening up the space for imagination (Liguori et al. 2022). Diverse literature and arts traditions, such as climate fiction, eco-fiction, Afrofuturism (and its African counterpart, africanfuturism), Asian futurism, and Indigenous futurisms grounded in sovereign rights, offer a wide variety of promising ways to address and potentially transform unsustainable practices and structures, as well as injustices, not least in the realm of biodiversity (Anderson 2016; Mitchell and Chaudhury 2020).

Using arts and creative practices can help to engage with the deeper leverage points (fundamental myths, paradigms and systems of meaning-making) for transformative change, opening up horizons (Vervoort et al. 2025). Researchers, creative practitioners, and artists that collaborated in the European Horizon 2020 project Creative Practices for Transformational Futures (CreaTures[2]) developed a tool aimed at supporting dialogues around the relations between creative practices and transformations for sustainability. This '9 Dimensions tool' can help make explicit how creative practices can contribute to exploring transformative possibilities, consisting of three main categories for change, and nine dimensions: 'changing meanings (embodying, learning, and imagining); changing connections (caring, organising, and inspiring); and changing power (co-creating, empowering, and subverting)' (Vervoort et al. 2024).

4.3 The process of developing just and nature-positive pathways

In this section, we focus on to the process of developing pathways towards just and nature-positive futures. We consecutively zoom in on transformative change (4.3.1) and plurality (4.3.2),and provide suggestions on how to operationalise them.

4.3.1 How to account for transformative change in pathways

A great starting point for transformative pathways development is the Three Horizons model, developed by Sharpe et al. (2016), which serves as an intuitive and accessible framework to guide and explore discussions on transformative change. It helps to facilitate discussions on how shifts from incumbent systems to new, alternative ones might actually happen and helps users navigate complexity and uncertainty while allowing for users' agency. The 'three horizons' named in its title

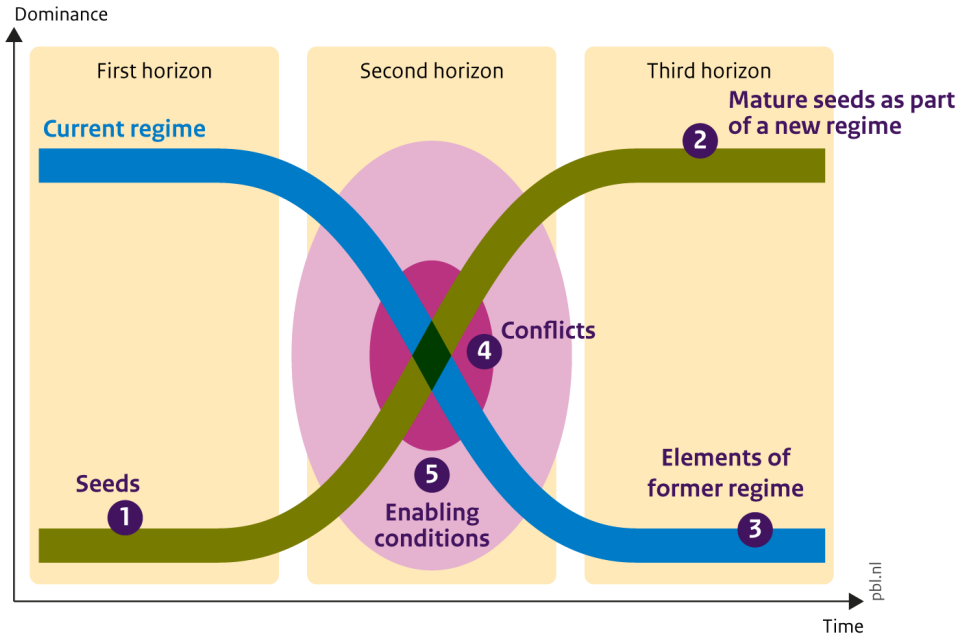
[1] For an example, see: Deliberative democracy: a guide for local authorities - Congress of Local and Regional Authorities

[2] See Creatures: Creative Practices for Transformational futures

represent the current dominant system (H1), transformation dynamics (H2), and emerging niches, or *seeds*, with transformative potential (H3). These are plotted over time (x-axis) and their fitness or compatibility with the current context (y-axis) (Curry 2015; Sharpe et al. 2016). An adapted version of the model reframes the horizons as transformation phases (Raudsepp-Hearne et al. 2020; see Figure 12): H1 as the unsustainable present with emerging seeds; H2 as the transitional phase characterised by conflicts and enabling conditions for seeds; and H3 as the envisioned future where successful seeds flourish as part of a new regime/system. In this version, the y-axis reflects the relative dominance of regimes or niches, slightly modifying the original model's focus on landscape fitness (Raudsepp-Hearne et al. 2020). In the past decade, the Three Horizons framework has been used by a significant number of practitioners and researchers, most notably in research around the concept of Seeds of Good Anthropocenes (SoGA) (Bennett et al. 2016; Pereira et al. 2021; Raudsepp-Hearne et al. 2020).

Figure 12

Three horizons framework

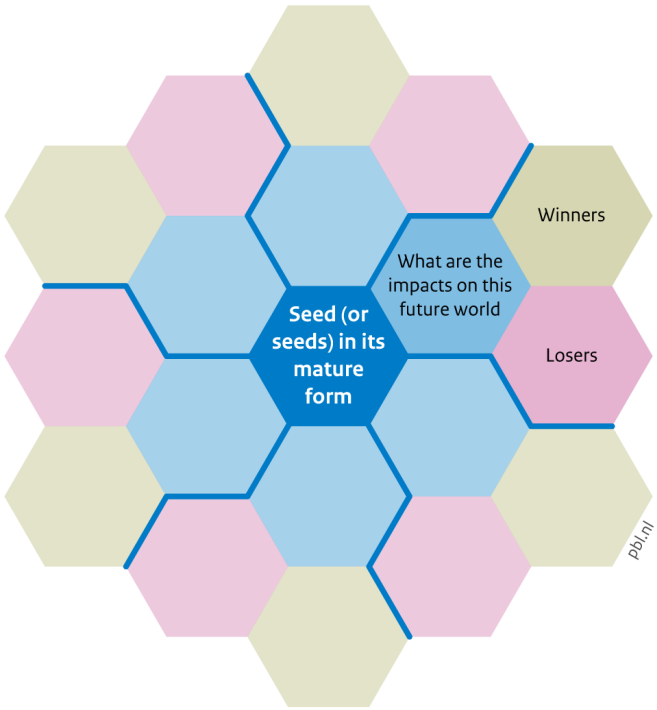


Source: Raudsepp-Hearne et al. 2020, adapted from Sharpe et al. 2016

SoGA is an approach for envisioning futures based on seeds (Raudsepp-Hearne et al. 2020). As a first step, futures, or so-called visions, are imagined in which seed initiatives have matured and become part of the mainstream, using what they call 'future wheels' (see Figure 13). In a future wheel, the centre represents a future in which one or multiple seeds have matured and constitute a new regime. Surrounding this centre are the impacts this (constellation of) of mature seed(s) (and thus the new regime) has on other actors and the world. The second ring shows who are winners and losers in this imagined future (Raudsepp-Hearne et al. 2020; Rutting et al. 2023). Both the Three Horizons Framework and future wheels have already been used as tools for developing nature futures (e.g., Lundquist et al. 2017). On its own, and as a tool, the Three Horizons framework (Sharpe et al. 2016) can be used to guide participatory discussions on how seeds can spur transformative change, i.e. to articulate pathways of transformation toward a future in which seeds have matured and become part of a new, more just and sustainable regime according to participating actors (Raudsepp-Hearne et al. 2020).

Power dynamics and shifts play a pivotal role in transformations, as we explained in Chapter 2. It is therefore important to pay explicit attention to power in the development of just, nature-positive pathways. The *Disruptive Seeds (DS)* approach adds a focus on the role of power dynamics and shifts in transformations. Zooming in on Horizon 2 (H2) of the Three Horizons framework (the transitional phase), DS offers a set of questions for guiding the dialogue on power dynamics and the power shifts needed for transformative change to unfold, with specific questions regarding the regime and seeds themselves (Rutting et al. 2023). These questions can help make explicit power dynamics and thereby articulate strategies for transformative change (see Table 1).

Figure 13
Future wheel

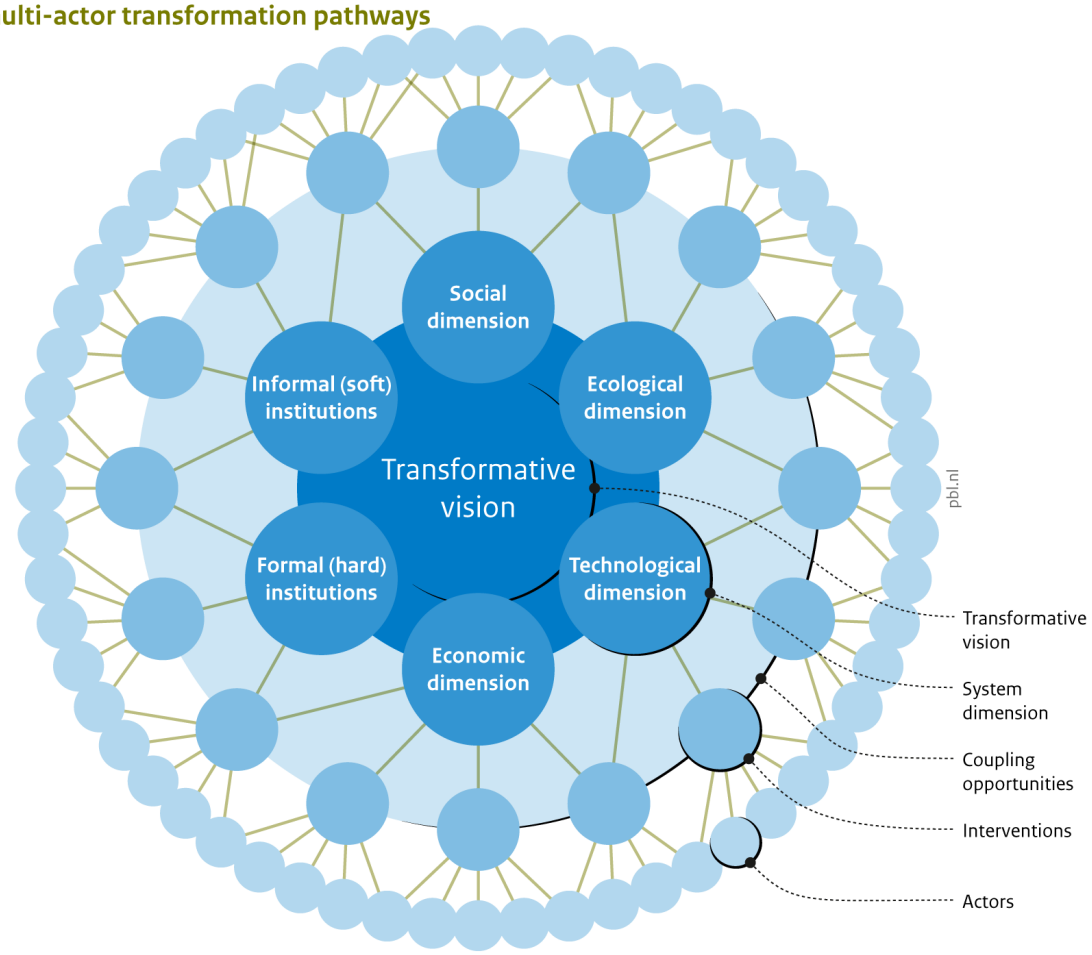


Source: Adapted from Raudsepp-Hearne et al. 2019

A complementary and integrative approach to guiding multi-actor governance for transformative change is the Transformation Flower Approach, or TFA (see Figure 14) (Huntjens et al. 2025). The TFA provides a structured yet flexible framework consisting of four interlinked phases. The first phase focuses on tailoring transformative efforts to specific social, ecological, economic, and spatial contexts, mapping stakeholder needs and priorities, and co-creating shared, concrete visions that integrate eco-social values and guide backcasting towards actionable pathways. The second phase focuses on identifying leverage points for transformative change, including key drivers and enabling conditions, and then linking these to coherent governance interventions and transition pathways. This phase is also about finding synergies between governance levers and strategies or seeds/niches such as regenerative agriculture or alternative economic models. The third phase focuses on building actor coalitions for transformative change, explicitly addressing differences in roles, power, and incentives, and fostering synergies across stakeholders and sectors. Finally, the fourth phase centres on co-evolutionary governance, emphasising iterative learning, multi-actor deliberation, and the continuous adaptation of institutions, practices, and policies over time (Huntjens et al. 2025).

Figure 14

Transformation flower approach: Co-creating sustainable and just futures through multi-actor transformation pathways



Source: Huntjens et al., 2025

Table 1
Guiding questions about power in transformative change (from Disruptive Seeds; Rutting et al. 2023)

Questions regarding the regime	Questions regarding the seeds/niches
What are the key elements of the current dominant system (the regime)?	What is the focus of the seeds/niches, and what are its key components? Think about both the components that are currently present and the ones that are currently missing.
Which unsustainable parts of the current regime need to go in order to achieve just and nature-positive futures?	What conflicts need to emerge to make the unsustainable parts of the regime go? How can these components of and structures associated with the regime be unmade?
How does the current regime exercise reinforcive power? What strategies does it use to maintain and defend itself/its institutions and structures?	How do the seeds/niches exercise transformative power (e.g. through prefiguration)? What strategies are there to destabilise the regime? What resources are needed? How can this transformative power disrupt current regime structures?
What macro-trends are aligned with the regime?	How do the seeds/niches challenge dominant macrotrends? What counter-macro-trends are aligned with seeds/niches? Are there synergies between the seeds/niches and these counter-macro-trends?
Which actor groups are aligned with the regime?	What actor groups are aligned with the seeds/niches? How will these actors organise themselves? Who will support them? What are the roles of the relevant actors? How can new actor groups be 'recruited'?
How will current unsustainable systems/ actors defend themselves against change? How will they try to inhibit the seeds/niches?	How can actors aligned with the seeds/niches disrupt the current regime?
How does the regime use discursive tools such as the media?	How will actors aligned with the seeds/niches use discursive tools?
Does the regime use coercion or manipulation? Who lobbies for the regime and how?	How can change be brought about through 'playing by the rules' of the regime?
Overarching question: How does the power shift from the current system to a new system happen? Describe the power struggles and shifts: how do we go from the current, unsustainable situation to a vision of a world in which the seeds/niches have become dominant (e.g. are there tipping points)?	Overarching question: How does the power shift from the current system to a new system happen? Describe the power struggles and shifts: how do we go from the current, unsustainable situation to a vision of a world in which the seeds/niches have become dominant (e.g. are there tipping points)?

4.3.2 How to account for plurality in pathways

Plurality of imaginaries and knowledge systems

Societal imaginaries can both limit and enhance transformative imagination, which we touched upon before in section 2.5.3. It is therefore important to pay explicit attention to imaginaries in processes of participatory scenario development. It all starts with diverse, inclusive participation, representing a plurality of knowledge traditions. This is a precondition for the inclusion of plural imaginaries. Thus, it is important to first conduct a reflexive preliminary analysis of the field that goes beyond conventional stakeholder analysis, and beyond the networks of the organisers.

One way to more directly incorporate alternative imaginaries as well as different value orientations into scenario narratives or pathways, is to weave specific characters into scenario narratives. This can include change agents or representatives of Indigenous communities (Burnam-Fink 2015; Spijkers et al. 2021). Introducing characters with diverse viewpoints can bring elements of stakeholder agency into pathways and help reveal contrasting interpretations of different components of the pathway. This, in turn, makes space for multiple ways of framing systems and issues informed by the characters' perspectives and values, and, by extension, the imaginaries aligned with this.

One example of an interesting approach for engaging with imaginaries in developing pathways is Causal Layered Analysis (CLA) (Inayatullah 1998). CLA seeks to uncover deeper layers of meaning and embraces diverse epistemic modes, or ways of knowing, while fostering dialogue imagined futures. In doing so, it 'allows for a range of transformative actions' (Inayatullah 1998). To do so, CLA distinguishes four layers of futures thinking: (1) the litany, referring to surface-level data, events, and issues; (2) social causes; (3) structures and worldviews that shape these causes; and (4) metaphors and myths, i.e. the profound narratives, hidden values, and unconscious beliefs that underlie worldviews. Imaginaries are situated primarily in the latter two layers. Consequently, CLA can help articulate and clarify the imaginaries that participants bring into scenario processes. It can also help 'decolonise dominant visions of the future' by 'deconstructing particular futures, exploring alternative orderings of knowledge, and genealogies of the present and the future' (Inayatullah 1998). Starting a scenario development process with CLA can encourage participants to adopt an appropriately reflexive mindset by making these layers visible. Achieving this requires a reflexive attitude towards the epistemic assumptions in scenario planning, including the prevailing influence of Eurocentric scientific traditions.

Another approach that draws on CLA is narrative foresight (Milojević and Inayatullah 2015), which focuses on the stories about the future that individuals, organisations, states, and civilisations construct for themselves, and investigates the worldviews, myths, and metaphors underlying these imagined futures. By making these narratives and their deeper layers explicit, and reshaping them so they align with desired futures, narrative foresight uses the power of storytelling to challenge 'official frameworks of meaning' (Milojevic & Inayatullah 2015) often set by dominant institutions, particularly those originating in high-income countries. In addition to CLA, narrative foresight can help make explicit the different imaginaries that exist and the hidden power dynamics between them.

Moreover, when developing just and nature-positive pathways, it is important to collectively – both conveners and participating stakeholders – reflect on the different knowledge systems and traditions that underpin ideas of the future, both upfront and throughout the process. When doing

workshops, for example, this reflection could take place after each workshop day. What is your cultural background, positionality, what are your epistemological assumptions? What are your blind spots? And what can be learnt from alternative perspectives on knowledge? A decolonial perspective, for example, can help enhance reflexivity regarding one's own epistemologies, and which knowledge systems are (often implicitly) dominant in one's thinking. These reflections can be written down on sticky notes, after which the conveners/facilitators summarise them. Such perspectives can help recognise how these dominant forms of knowledge shape ideas of the future, and can help challenge the presumed objectivity and universality of certain knowledge traditions (Wijsman and Feagan 2019). Through practicing reflexivity towards different forms of knowledge, participants in pathway development can examine their own, personal knowledge: how have their education, contextualised experience, and the epistemic communities in which they operate shaped this? A particularly interesting approach for reflexivity regarding different knowledge systems is participatory action research (PAR). This method offers an approach to knowledge production that is inherently reflexive of the perspective and also of the biases of actors involved (Mohr 2021). PAR does not claim to be objective, but rather, it can help to 'to disrupt and destabilize the characterization of traditional knowledge production and social science research as objective, apolitical, and democratic' (Houh and Kalsem 2015). Ideally, transformative knowledge is created in a reciprocal way, through a dialogical process of participatory problem diagnosis, knowledge co-production, and collective action between different groups of stakeholders (Benedum et al. 2022).

Plurality of values: The Nature Futures Framework

Over the past few years, different frameworks aimed at distinguishing different types of values of nature underlying people's worldviews and perspectives on desirable futures have been developed. Two prominent examples include the Nature Futures Framework (NFF) (Pereira et al. 2020) and the Life Framework of Values (O'Connor and Kenter 2019; Pascual et al. 2017). The NFF was developed as a visual heuristic tool for articulating the plurality of values of nature in scenario development processes (see Figure 15). The Life Framework of Values, on the other hand, was introduced in the IPBES Values Assessment to serve as a lens for examining how different value typologies interrelate (IPBES 2022). Both conceptual frameworks aim to advance and operationalise the idea of plurality in values of nature within the science–policy interface and to catalyse research that informs nature policy through the use of a shared language.

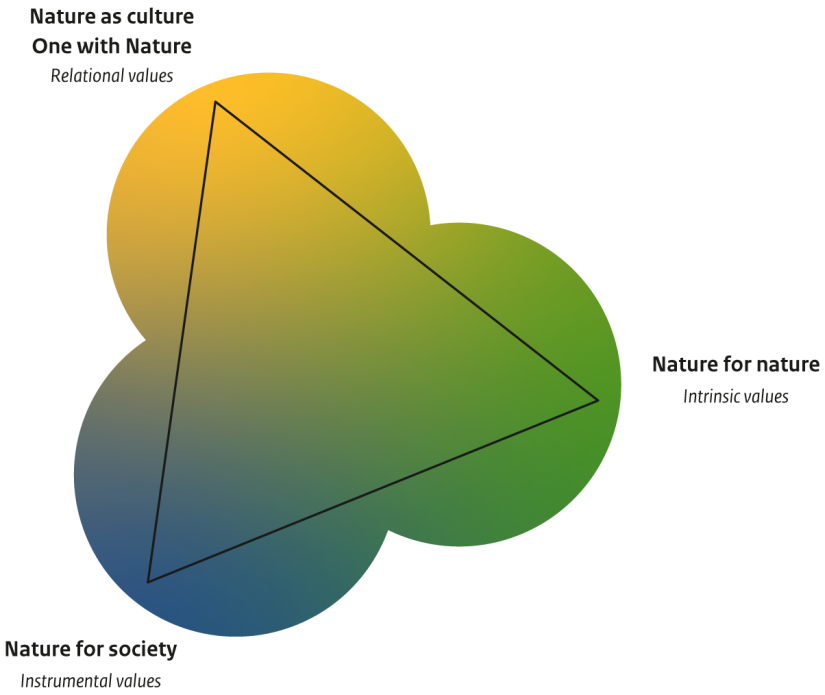
By explicitly engaging with plural value perspectives on nature, the NFF also allows for comparative scenario analysis across different geographical and socio-cultural contexts as well as different scales. It responds to the limitations of previous scenario approaches by offering a tool to develop nature-centric scenarios that reflects the diverse relationships between people and nature. This tool can also inform context-specific policy decisions grounded in local values of nature to achieve a good quality of life for both people and nature itself (IPBES 2022; Pereira et al. 2020). In fact, the NFF was specifically designed to catalyse the development of desirable futures for nature grounded in a plurality of values of nature. As such, it was created through an iterative and participatory process involving stakeholders, including policymakers, Indigenous Peoples, local knowledge holders, and a range of academic experts, among others (IPBES 2022; Lundquist et al. 2021, 2017; Pereira et al. 2020).

The NFF emphasises the plurality of values of nature that exist in society, depicting them as a conceptual space or gradient encompassing infinitely diverse value positions situated between axes representing three value perspectives: 'nature for nature', which most closely relates to intrinsic values; 'nature for society', which aligns primarily with instrumental values; and 'nature as

culture'/'one with nature', which corresponds most strongly to relational values, including reciprocity and sense of place. The NFF is not intended to be prescriptive, nor does it depict a static categorisation of value orientations. It recognises that the three value perspectives of intrinsic, instrumental, and relational (Himes et al. 2024) represent only one way of categorising how people relate to and perceive nature. More practically speaking, the NFF can be applied to develop and compare scenarios that explore different value orientations towards nature. It can also be used to map existing scenario studies and policy interventions within this conceptual space in order to identify biases or gaps[3].

Figure 15

Nature Futures Framework



Source: IPBES 2022; Durán et al. 2023; adapted by PBL

Although beyond the scope of this study, we do want to mention that research into values of nature is currently expanding. This includes research into how values and emotions play a role in the formation of people's subjective views and images of the future (Zimmermann et al. 2026), as well as research extending the values space of the NFF to also include *negative* values of nature (Oostvogels et al. 2024), which can yield a more complete picture of the plurality of values of nature.

[3] Examples of NFF applications in specific contexts, as well as discussions and further iterations of the framework, can be found in the NFF library: Nature Futures Framework | Zotero

4.3.3 Be reflexive towards the inherent politics

Being reflexive towards the inherent politics of collectively imagining futures is important when organising, facilitating, and/or participating in foresight processes. As touched upon above, it is important to recognise and understand the different imaginaries that are expressed in the collectively imagined visions and pathways. Which imaginaries are dominant in the collectively imagined futures? Are these dominant social imaginaries constraining or inhibiting the imagination of alternative futures that fundamentally differ from the present? How can we 'provoke and transform' them (Dey and Mason 2018)? This requires 'seeing through' the dominant social imaginary (or imaginaries) (Dey and Mason 2018). The next step is to problematise it, and subsequently, to overcome the limiting effects of the dominant imaginary. To do so requires the inventiveness to shake up (or *disrupt*) it—i.e. the capacity to imagine alternative realities that challenge the dominant imaginary (Dey and Mason 2018). To this end, we recommend to include a process step in which participants collectively reflect on the imaginaries that shape their conceptions of the present and future before engaging in the actual futures process.

5 Concluding remarks

There is a need for the development of just and nature-positive visions and pathways to achieve the international biodiversity goals and targets as agreed upon in the Kunming-Montreal Global Biodiversity Framework. In this report, we contributed to addressing this need by developing a conceptual framework that integrates crucial insights from a range of social science literatures, which offers a conceptual foundation to support articulating transformative pathways. Moreover, we clarified what is meant by transformations and the role of power dynamics therein and distinguished it from incremental change. We also explicitly connected it to justice and plurality, which are important concepts in achieving just transformative change. We positioned justice as an ambition as well as a guiding principle and a critical lens for developing pathways towards just and nature-positive futures. Simultaneously, justice functions as a tool for reflexivity for those developing and using these pathways, prompting a reflective stance on one's own positionality and assumptions about the future. In positioning justice as central, the framework sought to draw attention to the importance of creating space for marginalised voices and alternative knowledge systems in collectively imagining diverse possible just and nature-positive futures and pathways towards them. In addition, we highlighted the role that plurality – of imaginaries, knowledge systems, and values of nature – plays in just transformative change. The conceptual framework presented in this report serves as both a stand-alone contribution and a conceptual foundation for potential subsequent empirical and participatory work on developing pathways.

By providing a set of guidelines for developing just and nature-positive transformation pathways, focused on embedding justice, awareness of power, and plurality at every step of the process, we hope this report inspires others to initiate additional and complementary efforts around such pathways. The examples of tools and approaches provided in Chapter 4, for example, can help to take into account transformative change and plurality in participatory development processes. These examples are, of course, by no means exhaustive. Nonetheless, we believe that they provide a useful starting point, while we also want to note that there are additional approaches that can be helpful or complementary to the ones introduced here. Methods can also be combined, adapted, and tailored to specific project objectives and contexts. Finally, we recognise that our own conceptual framework is neither exhaustive nor definitive. It reflects our own backgrounds and assumptions, and as such, we could have missed contributions from certain fields we are less familiar with. In addition, we did not explicitly engage with the ways in which transformative pathways can inform actual policy development and governance more generally. This is, of course, a crucial step that needs to be addressed in follow-up studies. Therefore, we position this study as an invitation to further dialogue, critique, and iterative adaptation. We regard it as an evolving contribution that needs to be tested, challenged, and enriched through practice and engagement with diverse actors and in different contexts.

References

Agrawal, A., and K. Redford (2009). 'Conservation and displacement: An overview.' *Conservation & Society* 7(1): 1-10.

Agyeman, J., D. Schlosberg, L. Craven, and C. Matthews (2016). 'Trends and directions in environmental justice: From inequity to everyday life, community, and just sustainabilities.' *Annual Review of Environment and Resources* 41: 321-340.

Ahlqvist, T., and M. Rhisiart (2015). 'Emerging pathways for critical futures research: Changing contexts and impacts of social theory'. *Futures* 71, 91–104.

Álvarez, L., and B. Coolsaet. (2020) 'Decolonising environmental justice studies: A Latin American perspective.' *Capitalism, Nature, Socialism* 31(2): 50-69.

Anderson, R. (2016) 'Afrofuturism 2.0 & the Black Speculative Arts Movement: Notes on a manifesto.' *Obsidian* 42: 228-236.

Aschi, F., S.C. Dekker, D. Leclère, A. Marques, C. Neumann, G. Ambrosio, and D.P. Van Vuuren (2026). 'Can we bend the curve: Trends in global biodiversity scenarios.' *Science Advances* 12.

Avelino, F. (2017) 'Power in sustainability transitions: Analysing power and (dis)empowerment in transformative change towards sustainability.' *Environmental Policy and Governance* 27(3-4): 505-520.

Avelino, F., K. Wijsman, F. Van Steenbergen, S. Jhagroe, J. Wittmayer, S. Akerboom, K. Bogner, E.F. Jansen, N. Frantzeskaki, and A. Kalfagianni (2024). 'Just sustainability transitions: Politics, power, and prefiguration in transformative change toward justice and sustainability.' *Annual Review of Environment and Resources* 49(1): 519-547.

Bai, X., S. Van Der Leeuw, K. O'Brien, F. Berkhout, F. Biermann, E.S. Brondizio, C. Cudennec, J. Dearing, A. Duraiappah, M. Glaser, A. Revkin, W. Steffen, and J. Syvitski (2016). 'Plausible and desirable futures in the Anthropocene: A new research agenda.' *Global Environmental Change* 39: 351–362.

Barendregt, L. , and B.F. Van Eekelen (2024). 'Public participation in futuring: A systematic literature review.' *Futures* 158.

Bendor, R., D. Maggs, R. Peake, J. Robinson, and S. Williams (2017). 'The imaginary worlds of sustainability: Observations from an interactive art installation.' *Ecology and Society* 22(2).

Benedum, M., B.E. Goldstein, A. Ely, M. Apgar, L. Pereira, and D. Manuel-Navarrete (2022). 'Lessons for transformations organisations from the pathways network: A transformations community dialogue.' *Social Innovations Journal* 15(5).

Bengston, D. N., G. H. Kubik, and P. C. Bishop. (2012). 'Strengthening Environmental Foresight: Potential Contributions of Futures Research.' *Ecology and Society* 17.

Bennett, E., R. Biggs, R. Calderón Contreras, R. Golden Kroner, A. Vianna Mansur, S. Woroniecki, S. Acar, Z. Aksoy, F. Alpizar, D. Lam, A.-I. Horcea-Milcu, B.-O. Linnér, L. Mehta, C.M. Campos, M. Nishi, N. Roskruge, M. Richardson, C. Sabinot, C. Simão Seixas, H. Stokland, C. Guibal, and L.A. Garibaldi (2025). *IPBES Transformative Change Assessment.* Bonn: IPBES Secretariat.

Bennet, E.M., M. Solan, R. Biggs, T. McPhearson, A.V. Norström, P. Olsson, L. Pereira, G.D. Peterson, C. Raudsepp-Hearne, F. Biermann, S.R. Carpenter, E.C. Ellis, T. Hichert, V. Galaz, M. Lahsen, M. Milkoreit, B. Martin López, K.A. Nicholas, R. Preiser, G. Vince, J.M. Vervoort, and J. Xu (2016). 'Bright spots: Seeds of a good Anthropocence.' *Frontiers in Ecology and the Environment* 14(8): 441-448.

Bentz, J., K. O'Brien, and M. Scoville-Simonds (2022). 'Beyond "blah blah blah": Exploring the "how" of transformation.' *Sustainability Science* 17: 497-506.

Beretta, I., and C. Bracchi (2023). 'Climate-neutral and smart cities: A critical review through the lens of environmental justice.' *Frontiers in Sociology* 8.

Berger, P.L., and T. Luckmann (1989). *The Social Construction of Reality: A Treatise in the Sociology of Knowledge.* New York: Anchor Books.

Bluwstein, J. (2021) 'Colonising landscapes/landscaping colonies: From a global history of landscapism to the contemporary landscape approach in nature conservation.' *Journal of Political Ecology* 28(1).

Blythe, J., J. Silver, L. Evans, D. Armitage, N.J. Bennett, M. Moore, T.H. Morrison, and K. Brown (2018). 'The dark side of transformation: Latent risks in contemporary sustainability discourse.' *Antipode* 50: 1206-1223.

Bogner, K., B. Kump, M. Beekman, and J. Wittmayer (2024). 'Coping with transition pain: An emotions perspective on phase-outs in sustainability transitions.' *Environmental Innovation and Societal Transitions* 50.

Börjeson, L., M. Höjer, K.-H. Dreborg, T. Ekvall, and G. Finnveden (2006). 'Scenario types and techniques: Towards a user's guide.' *Futures* 38: 723-729.

Bourdieu, P. (1991) *Language and Symbolic Power.* Cambridge: Polity Press.

Brisbois, M.C. (2019) 'Powershifts: A framework for assessing the growing impact of decentralised ownership of energy transitions on political decision-making.' *Energy Research & Social Science* 50: 151-161.

Brugnach, M., and H. Ingram (2012). 'Ambiguity: The challenge of knowing and deciding together.' *Environmental Science & Policy* 15(1): 60-71.

Buckton, S.J., I. Fazey, B. Sharpe, E.S. Om, B. Doherty, P. Ball, K. Denby, M. Bryant, R. Lait, S. Bridle, M. Cain, E. Carmen, L. Collins, N. Nixon, C. Yap, A. Connolly, B. Fletcher, A. Frankowska, G. Gardner, A. James, I. Kendrick, A. Kluczkovski, S. Mair, B. Morris, and M. Sinclair (2023). 'The regenerative lens: A conceptual framework for regenerative social-ecological systems.' *One Earth* 6: 824-842.

Bulkeley, H., M. Kok, and L. Xie (2021). *Realising the urban opportunity: Cities and post-2020 biodiversity governance.* The Hague: PBL Netherlands Environmental Assessment Agency.

Bullard, R.D. (2001) 'Environmental justice in the 21st century: Race still matters.' *Phylon* 1960(49): 151-171.

Bullard, R.D., and G.S. Johnson (2000). 'Environmental justice: Grassroots activism and its impact on public policy decision-making.' *Journal of Social Issues* 56: 555-578.

Bullard, R.D., and B.H. Wright (1990) 'The quest for environmental equity: Mobilising the African-American community for social change.' *Society & Natural Resources* 3(4): 301-311.

Burnam-Fink, M. (2015) 'Creating narrative scenarios: Science fiction prototyping at Emerge.' *Futures* 70: 48-55.

Büscher, B., and R. Fletcher (2019). 'Towards convivial conservation.' *Conservation & Society* 17(3): 283-296.

Castoriadis, C. (1987) *The Imaginary Institution of Society.* Cambridge: Polity Press.

Castro-Gómez, S. (2005) *La Hybris del Punto Cero.* Bogotá: Pontificia Universidad Javeriana.

CBD (2022). 'Kunming-Montreal Global Biodiversity Framework.' Available at: https://www.cbd.int/gbf. Accessed on 9 February 2026.

Chaffin, B.C., A.S. Garmestani, L.H. Gunderson, M.H. Benson, D.G. Angeler, C.A. Arnold, B. Cosens, R.K. Craig, J.B. Ruhl, and C.R. Allen (2016). 'Transformative environmental governance.' *Annual Review of Environment Resources* 41.

Cologna, V., and N. Oreskes (2022). 'Don't gloss over social science! A response to: Glavocic et al. (2021) "The tragedy of climate change science".' *Climate and Development* 14(9): 839-841.

Cornell, S., F. Berkhout, W. Tuinstra, J.D. Tàbara, J. Jäger, I. Chabay, B. de Wit, R. Langlais, D. Mills, P. Moll, I.M. Otto, A. Petersen, C. Pohl, and L. van Kerkhoff (2013). 'Opening up knowledge systems for better responses to global environmental change.' *Environmental Science & Policy* 28: 60-70.

Curry, A. (2015) 'Searching for systems: Understanding Three Horizons.' *Association of Professional Futurists Compass, January 2015:11–13*

De Bruin, S.P., J. van Vliet, I. Lehmann, and P. Verburg (2023) 'Perceptions of equity in conservation scenarios: Half Earth and Sharing the Planet.' *Environmental Science & Policy* 144: 124-136.

De Geus, T., F. Avelino, M. Strumińska-Kutra, M. Pitzer, J.M. Wittmayer, L. Hendrikx, V. Joshi, N. Schrandt, L. Widdel, M. Fraaije, M. Iskandarova, S. Hielscher, and K. Rogge (2023). 'Making sense of power through transdisciplinary sustainability research: Insights from a Transformative Power Lab.' *Sustainability Science* 18: 1311-1327.

De Haan, J., and J. Rotmans (2011). 'Patterns in transitions: Understanding complex chains of change.' *Technological Forecasting & Social Change* 78(1): 90-102.

De Pater, M. (2025) 'Functions and dimensions of pluralism in transformative governance for biodiversity.' *Ecosystems and People* 21(1).

Devaney, L., D. Torney, P. Brereton, and M. Coleman (2020). 'Ireland's citizens' assembly on climate change: Lessons for deliberative public engagement and communication.' *Environmental Communication* 14(2): 141-146.

Dewulf, A., M. Craps, and G. Dercon (2004). 'How issues get framed and reframed when different communities meet: A multi-level analysis of a collaborative soil conservation initiative in the Ecuadorian Andes.' *Journal of Community & Applied Psychology* 14(3): 177-192.

Dewulf, A., B. Gray, L. Putnam, R. Lewicki, N. Aarts, R. Bouwen, and C. van Woerkum (2009). 'Disentangling approaches to framing in conflict and negotiation research: A meta-paradigmatic perspective.' *Human Relations* 62: 155-193.

Dey, P., and C. Mason (2018). 'Overcoming constraints of collective imagination: An inquiry into activist entrepreneuring, disruptive truth-telling and the creation of "possible worlds".' *Journal of Business Venturing* 33(1): 84-99.

Díaz, S., S. Demissew, J. Carabias, C. Joly, M. Lonsdale, N. Ash, A. Larigauderie, J.R. Adhikari, S. Arico, A. Báldi, A. Bartuska, I.A. Baste, A. Bilgin, E. Brondizio, K.M. Chan, V.E. Figueroa, A. Duraiappah, M. Fischer, R. Hill, T. Koetz, P. Leadley, P. Lyver, G.M. Mace, B. Martin-Lopez, M. Okumura, D. Pacheco, U. Pascual, E.S. Pérez, B. Reyers, E. Roth, O. Saito, R.J. Scholes, N. Sharma, H. Tallis, R. Thaman, R. Watson, T. Yahara, Z.A. Hamid, C. Akosim, Y. Al-Hafedh, R. Allahverdiyev, E. Amankwah, S.T. Asah, Z. Asfaw, G. Bartus, L.A. Brooks, J. Caillaux, G. Dalle, D. Darnaedi, A. Driver, G. Erpul, P. Escobar-Eyzaguirre, P. Failler, A.M.M. Fouda, B. Fu, H. Gundimeda, S. Hashimoto, F. Homer, S. Lavorel, G. Lichtenstein, W.A. Mala, W. Mandivenyi, P. Matczak, C. Mbizvo, M. Mehrdadi, J.P. Metzger, J.B. Mikissa, H. Moller, H.A. Mooney, P. Mumby, H. Nagendra, C. Nesshover, A.A. Oteng-Yeboah, G. Pataki, M. Roué, J. Rubis, M. Schultz, P. Smith, R. Sumaila, K. Takeuchi, S. Thomas, M. Verma, Y. Yeo-Chang, and D. Zlatanova (2015). 'The IPBES Conceptual Framework – Connecting nature and people.' *Current Opinion in Environmental Sustainability* 14: 1-16.

Díaz, S., U. Pascual, M. Stenseke, B. Martín-López, R.T. Watson, Z. Molnár, R. Hill, K.M.A. Chan, I.A. Baste, K.A. Brauman, S. Polasky, A. Church, M. Lonsdale, A. Larigauderie, P.W. Leadley, A.P.E. van Oudenhoven, F. van der Plaat, M. Schröter, S. Lavorel, Y. Aumeeruddy-Thomas, E. Bukvareva, K. Davies, S. Demissew, G. Erpul, P. Failler, C.A. Guerra, C.L. Hewitt, H. Keune, S. Lindley, and Y. Shirayama (2018). 'Assessing nature's contributions to people.' *Science* 359(6373): 270-272.

Díaz, S., J. Settele, E.S. Brondízio, H.T. Ngo, J. Agard, A. Arneth, P. Balvanera, K.A. Brauman, S.H.M. Butchart, K.M.A. Chan, L.A. Garibaldi, K. Ichii, J. Liu, S.M. Subramanian, G.F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razzaque, B. Reyers, R.R. Chowdhury, Y.-J. Shin, I. Visseren-Hamakers, K.J. Willis, and C.N. Zayas (2019). 'Pervasive human-driven decline of life on Earth points to the need for transformative change.' *Science* 366(6471).

Dreborg, K.H. (1996) 'Essence of backcasting.' *Futures* 28(9): 813-828.

Escobar, A. (2020). *Pluriversal Politics: The Real and the Possible.* Durham: Duke University Press.

Escobar, A. (2011) *Encountering Development: The Making and Unmaking of the Third World.* Princeton: Princeton University Press.

Fairhead, J., M. Leach, and I. Scoones (2012). 'Green grabbing: A new appropriation of nature?' *Journal of Peasant Studies* 39(2): 237-261.

Feldman, S., and S. Biggs (2012). 'The politics of international assessments: The IAASTD process, reception and significance.' *Journal of Agrarian Change* 12(1): 144-169.

Feola, G. (2015) 'Societal transformation in response to global environmental change: A review of emerging concepts.' *Ambio* 44: 376-390.

Feola, G., O. Vincent, and D. Moore (2012). '(Un)making in sustainability transformation beyond capitalism.' *Global Environmental Change* 69.

Few, R. K. Brown, and E.L. Tompkins (2007). 'Public participation and climate change adaptation: Avoiding the illusion of inclusion.' *Climate Policy* 7(1): 46-59.

Foxon, T.J., P.J.G. Pearson, S. Arapostathis, A. Carlsson-Hyslop, and J. Thornton (2013). 'Branching points for transition pathways: Assessing responses of actors to challenges on pathways to a low carbon future.' *Energy Policy* 52: 146-158.

Fraser, N. (2005) 'Reframing justice: In a globalising world.' *New Left Review* 36.

Gargallo, E., T. Haller, D. Chatty, S. Weissman, H. Meessen, M. Giger, R. Maisuradze, N. Iashvili, and N. Chkhobadze (2022). 'The new green grabbing frontier and participation: Conserving drylands with or without people', in: *Drylands Facing Change*, 131-152. Abingdon: Routledge.

Geels, F.W. (2005) 'Processes and patterns in transitions and system innovations: Refining the co-evolutionary multi-level perspective.' *Technological Forecasting and Social Change* 72(6): 681-696.

Geels, F.W. (2002) 'Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study.' *Research Policy* 31 (8-9): 1257-1274.

Glavovic, B.C., T.F. Smith, and I. White (2022). 'The tragedy of climate change science.' *Climate and Development* 14(9): 829-833.

Glucker, A.N., P.P.J. Driessen, A. Kolhoff, and H.A.C. Runhaar (2013). 'Public participation in environmental impact assessment: Why, who and how?' *Environmental Impact Assessment Review* 43: 104-111.

Godhe, B. M., and L. Goode, L. (2018). 'Critical Future Studies – A Thematic Introduction.' *Culture Unbound* 10(2), 151–162.

Grin, J., J. Rotmans, J. Schot, F.W. Geels, and D. Loorbach (2011). *Transitions to Sustainable Development: New Directions in the Study of Long-Term Transformative Change.* Abingdon: Routledge.

Hackmann, H., S.C. Moser, and A.L. St. Clair (2014). 'The social heart of global environmental change.' *Nature Climate Change* 4: 653-655. *Zeitschrift für Wirtschafts- und Unternehmensethik* 6: 343-358.

Hajer, M., and J. Oomen (2025). *Captured Futures: Rethinking the Drama of Environmental Politics*. Oxford: Oxford University Press.

Hale, T. (2024) *Long Problems: Climate Change and the Challenge of Governing Across Time.* Princeton: Princeton University Press.

Haluska, A. (2024). 'Restorative justice and the rights of nature: Using Indigenous legal traditions to influence cultural change and promote environmental protection.' *Mitchell Hamline Law Review* 49(1).

Hartman, L., F. Wilson, and D. Arnold (2005). 'Positive ethical deviance inspired by moral imagination.'

Hebinck, A., G. Diercks, T. Von Wirth, P.J. Beers, L. Barsties, S. Buchel, R. Greer, F. Van Steenbergen, and D. Loorbach (2022). 'An actionable understanding of societal transitions: The x-curve framework.' *Sustainability Science* 17: 1009-1021.

Helfgott, A. (2018) 'Operationalising systemic resilience.' *European Journal of Operational Research* 268(3): 852-864.

Herrera, H. (2017) 'Resilience for whom? The problem structuring process of the resilience analysis.' *Sustainability* 9.

Hölscher, K., J.M. Wittmayer, and D. Lorbach (2018). 'Transition versus transformation: What's the difference?' *Environmental Innovations and Societal Transitions* 27: 1-3.

Huntjens, P. (2021) *Towards a Natural Social Contract: Transformative Social-Ecological Innovation for a Sustainable, Healthy and Just Society.* Cham: Springer International Publishing.

Huntjens, P., and R. Kemp (2022). 'The importance of a natural social contract and co-evolutionary governance for sustainability transitions.' *Sustainability* 14(2976).

Huntjens, P., N. Mohamed, K. Hujo, and M. Desai (eds) (2025). *Eco-Social Contracts for Sustainable and Just Futures: Mobilising Collective Power to Deal with the 21st Century Polycrisis.* Cham: Springer Nature.

Huntjens, P., A. Rinscheid, R. Kemp, B. Van Helvoirt, N. Aarts, I. Visseren-Hamakers, A. Van Veen, and J. Hassink (2023). 'The transformation flower approach for leveraging change towards multiple value creation and institutional change.' Opensearch Amsterdam.

Hurlbert, M. (2023) 'Deliberative public engagement', in: *Varieties of Qualitative Research Methods: Selected Contextual Perspectives,* eds. J.M. Okoko, S. Tunison, and K.D. Walker, 9-21. Cham: Springer International Publishing.

Huttunen, S., K. Kulha, S. Kyllönen, H. Mela, M. Ojanen, K. Soini, J. Sorvali, N. Suni, and H. Saarikoski (2025). 'Deliberating justice in citizen jury processes – Lessons for just transitions governance.' *Environmental Policy and Governance* 35: 868-881.

Immovili, M., and K. Kok (2020). *Narratives for the "Half Earth" and "Sharing the Planet" scenarios.* The Hague: PBL Netherlands Environmental Assessment Agency.

Inayatullah, S. (1998) 'Causal layered analysis: Poststructuralism as method.' *Futures* 30: 815-829.

IPBES (2026). *IPBES Business and Biodiversity Assessment: Summary for Policymakers.* Geneva: Zenodo.

IPBES (2025). *IPBES Transformative Change Assessment: Full Report.* Geneva: Zenodo.

IPBES (2023). *The Natures Futures Framework, a flexible tool to support the development of scenarios and models of desirable futures for people, nature and Mother Earth, and its methodological guidance.* Bonn: IPBES Secretariat.

IPBES (2022). *Methodological Assessment of the Diverse Values and Valuation of Nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* Geneva: Zenodo.

IPBES (2019). *Global Assessment Report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.* Bonn: IPBES Secretariat.

IPBES (2016). *The Methodological Assessment Report on Scenarios and Models of Biodiversity and Ecosystem Services.* Geneva: Zenodo.

Jasanoff, S., and S.-H. Kim (2019). *Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power.* Chicago: Chicago University Press.

Jasanoff, S., and S.-H. Kim (2013). 'Sociotechnical imaginaries and national energy policies.' *Science and culture* 22: 189-196.

Joseph Aboi, E. (2024) 'Against decolonisation: Taking African agency seriously.' *Olúfémi Táíwò African Affairs* 123: 277-279.

Kipar, A.O., V. Galiulo, G. Signorini, and D. Galimberti (2026). 'Nature-positive: Transforming cities and landscapes with scalable strategies and projects. Insights from LAND's case studies', in: *Nature-Positive Cities: Adaptive Spatial Planning in Italy for an Ecological Urban Transition*, eds. A. De Toni, A. Arcidiacono, and S. Ronchi, 103-113. Cham: Springer Nature.

Kok, M., M. Immovilli, A. Fransen, M. van Oorschot, T. Dassen, S. Van der Jagt, and J. Meijer (2022). *Exploring nature-positive pathways: A contribution to the implementation of the CBD post-2020 Global Biodiversity Framework.* The Hague: PBL Netherlands Environmental Assessment Agency.

Koot, S., B. Büscher, and L. Thakholi (2024). 'The new green apartheid? Race, capital and logics of enclosure in South Africa's wildlife economy.' *Environmental Planning and Ecology* 7: 123-140.

Kortetmäki, T. (2017) 'Justice in and to nature: An application of the broad framework of environmental and ecological justice.' *Jyväskylä Studies in Education, Psychology and Social Research.*

Lambertini, M., J.W. Bull, L. Little Bear, H. Locke, D. Maseke, C.M. Rodríguez, and E. Zabey (2025). 'Becoming nature positive: The 'Great Transition' from tipping to turning point', in: *Routledge Studies in Conservation and the Environment*, eds. P. Vanham, R. Chainey, and G. Parkes, 95-158. London: Routledge.

Latour, B. (2004 'Why has critique run out of steam? From matters of fact to matters of concern.' *Critical Inquiry* 30: 225-248.

Laurell Thorslund, M., E. Eriksson, D. Pargman, M. Hesselgren, P. Thiel, M. Hedberg, and A. Martling (2025). 'Pastcasting: Engaging with seemingly unreachable futures.' *Futures* 171.

Lawhon, M. and J.T. Murphy (2012). 'Socio-technical regimes and sustainability transitions: Insights from political ecology.' *Progress in Human Geography* 36: 354-378.

Leadley, P., A. Gonzalez, D. Obura, C.B. Krug, M.C. Londoño-Murcia, K.L. Millette, A. Radulovici, A. Rankovic, L.J. Shannon, E. Archer, F.A. Armah, N. Bax, K. Chaudhari, M.J. Costello, L.M. Dávalos, F. de Oliveira Roque, F. DeClerck, L.E. Dee, F. Essl, S. Ferrier, P. Genovesi, M.R. Guariguata, Shizuka Hashimoto, Chinwe Ifejika Speranza, Forest Isbell, Marcel Kok, Shane D. Lavery, David Leclère, Rafael Loyola, Shuaib Lwasa, Melodie McGeoch, Akira S. Mori, Emily Nicholson, Jose M. Ochoa, Kinga Öllerer, Stephen Polasky, Carlo Rondinini, Sibylle Schroer, Odirilwe Selomane, Xiaoli Shen, Bernardo Strassburg, Ussif Rashid Sumaila, Derek P. Tittensor, Eren Turak, Luis Urbina, Maria Vallejos, Ella Vázquez-Domínguez, Peter H. Verburg,

Piero Visconti, Stephen Woodley, Jianchu Xu (2022). 'Achieving global biodiversity goals by 2050 requires urgent and integrated actions.' *One Earth* 5(6): 597-603

Leclère, D., M. Obersteiner, M. Barrett, S.H.M. Butchart, A. Chaudhary, A. De Palma, F.A.J. DeClerck, M. Di Marco, J.C. Doelman, M. Dürauer, R. Freeman, M. Harfoot, T. Hasegawa, S. Hellweg, J.P. Hilbers, S.L.L. Hill, F. Humpenöder, N. Jennings, T. Krisztin, G.M. Mace, H. Ohashi, A. Popp, A. Purvis, A.M. Schipper, A. Tabeau, H. Valin, H. van Meijl, W.-J. van Zeist, P. Visconti, R. Alkemade, R. Almond, G. Bunting, N.D. Burgess, S.E. Cornell, F. Di Fulvio, S. Ferrier, S. Fritz, S. Fujimori, M. Grooten, T. Harwood, P. Havlík, M. Herrero, A.J. Hoskins, M. Jung, T. Kram, H. Lotze-Campen, T. Matsui, C. Meyer, D. Nel, T. Newbold, G. Schmidt-Traub, E. Stehfest, B.B.N. Strassburg, D.P. van Vuuren, C. Ware, J.E.M. Watson, W. Wu, and L. Young (2020). 'Bending the curve of terrestrial biodiversity needs and integrated strategy.' *Nature* 585: 551-556.

Levin, S. (1999). *Fragile Dominion: Complexity and the Commons.* New York City: Basic Books.

Liguori, A., K. Le Rossignol, S. Kraus, L. McEwen, and M. Wilson (2022). 'Exploring the uses of arts-led community spaces to build resilience: Applied storytelling for successful co-creative work.' *Journal of Extreme Events* 9.

Locke, H., J. Rockström, P. Bakker, M. Bapna, M. Gough, J. Hilty, M. Lambertini, J. Morris, P. Polman, and C.M. Rodriguez (2021). 'A nature-positive world: The global goal for nature.' *Methods in Ecology and Evolution* 17: 1405-1417.

Loorbach, D., N. Frantzeskaki, and F. Avelino (2017). 'Sustainability transitions research: Transforming science and practice for societal change.' *Annual Review of Environment and Resources* 42.

Louis, M., and L. Maertens (2021). *Why international organisations hate politics: Depoliticising the world.* London: Routledge.

Lundquist, C., S. Hashimoto, M.A. Denboba, G. Peterson, L. Pereira, and D. Armenteras (2021). 'Operationalising the nature futures framework to catalyse the development of nature-future scenarios.' *Sustainability Science* 16: 1773-1775.

Lundquist, C.J., H.M. Pereira, and R. Alkemade (2017). 'Visions for nature and nature's contributions to people for the 21st century: Report from an IPBES visioning workshop held on 4-8 September 2017 in Auckland, New Zealand.' *NIWA Science and Technology.*

Macnaghten, P. (2021) 'Towards an anticipatory public engagement methodology: Deliberative experiments in the assembly of possible worlds using focus groups.' *Qualitative Research* 21: 3-19.

Mafongoya, P.L., and O.C. Ajayi (2017). *Indigenous knowledge systems and climate change management in Africa.* Wageningen: CTA.

Mangnus, A.C., J. Oomen, J.M. Vervoort, and M.A. Hajer (2021). 'Futures literacy and the diversity of the future.' *Futures* 132.

Mangnus, A.C., J.M. Vervoort, S.R. McGreevy, K. Ota, C.D.D. Rupprecht, M. Oga, and M. Kobayashi (2019). 'New pathways for governing food system transformations: A pluralistic practice-based futures approach using visioning, back-casting, and serious gaming.' *Ecology and Society* 24.

Martens, A., K. Vringer, J. Porsius, and J. Tennekes (2023). *Legitimiteit van beleid in beleidsevaluaties.* The Hague: PBL Netherlands Environmental Assessment Agency.

Martin, A., B. Coolsaet, E. Corbera, N.M. Dawson, J.A. Fraser, I. Lehmann, and I. Rodriguez (2016). 'Justice and conservation: The need to incorporate recognition.' *Biological Conservation* 197: 254-261.

McCauley, D.R., and R. Heffron (2018). 'Just transition: Integrating climate, energy and environmental justice.' *Energy Policy* 119: 1-7.

McElwee, P. (2025) 'New wine in old bottles? Key research gaps on neoliberal financing for biodiversity emerging from the Global Biodiversity Framework.' *Current Opinion in Environmental Sustainability* 76.

McPhearson, T., E.M. Cook, M. Berbés-Blázquez, C. Cheng, N.B. Grimm, E. Andersson, O. Barbosa, D.G. Chandler, H. Chang, M.V. Chester, D.L. Childers, S.R. Elser, N. Frantzeskaki, Z. Grabowski, P. Groffman, R.L. Hale, D.M. Iwaniec, N. Kabisch, C. Kennedy, S.A. Markolf, A.M. Matsler, L.E. McPhillips, T.R. Miller, T.A. Muñoz-Erickson, E. Rosi, and T.G. Troxler (2022). 'A social-ecological-technological systems framework for urban ecosystem services.' *One Earth* 5: 505-518.

Meijer, J., M. Kok, C. van Oosten, S.M. Subramanian and E. Yiu (2021). *Seizing the landscape opportunity to catalyse transformative biodiversity governance: A contribution to the CBD post-2020 Global Biodiversity Framework*. The Hague: PBL Netherlands Environmental Assessment Agency.

Midgley, G., I. Munlo, and M. Brown (1998). 'The theory and practice of boundary critique: Developing housing services for older people.' *Journal of Operational Research Society* 49: 467-478.

Milkoreit, M. (2017) 'Imaginary politics: Climate change and making the future.' *Elementa: Science of the Anthropocene* 5: 62.

Miller, C.A., and C. Wyborn (2020). 'Co-production in global sustainability: Histories and theories.' *Environmental Science and Policy* 113: 88-95.

Milojevic, I., and S. Inayatullah (2015). 'Narrative foresight.' *Futures* 73: 151-162.

Mitchell, A., and A. Chaudhury (2020). 'Worlding beyond the "end" of "the world": White apocalyptic visions and BIPOC futurisms.' *International Relations* 34: 309-332.

Mitchell, R.K., B.R. Agle, and D.J. Wood (1997). 'Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts.' *Academy of Management Review* 22: 853-886.

Monticelli, L. (ed) (2022) *The future is now: An introduction to prefigurative politics.* Bristol: Policy Press Scholarship Online.

Moore, M. (2012) 'Natural resources, territorial right, and global distributive justice.' *Political Theory* 40: 84-107.

Moore, M.-L. and M. Milkoreit (2020). 'Imagination and transformations to sustainable and just futures.' *Elementa: Science of the Anthropocene* 8(1):081

Muiderman, K., A. Gupta, J. Vervoort, and F. Biermann (2020). 'Four approaches to anticipatory climate governance: Different conceptions of the future and implications for the present.' *Wiley Interdisciplinary Reviews: Climate Change* 11.

Oates, L., A. Datey, A. Sudmant, R. Gillard, and A. Gouldson (2024). 'Community participation in urban land and housing delivery: Evidence from Kerala (India) and Dar es Salaam (Tanzania).' *Land* 13: 641.

Oates, L., and L. Verveld (2024). *Just transitions: Conceptual tools for policy reflection.* The Hague: PBL Netherlands Environmental Assessment Agency.

O'Brien, K., and J. Barnett (2013). 'Global environmental change and human security.' *Annual Review of Environment and Resources* 38: 373-391.

O'Connor, S., and J.O. Kenter (2019). 'Making intrinsic values work: Integrating intrinsic values of the more-than-human world through the Life Framework of Values.' *Sustainability Science* 14: 1247-1265.

Oomen, J., J. Hoffman, and M.A. Hajer (2022). 'Techniques of futuring: On how imagined futures become socially performative.' *European Journal of Social Theory* 25: 252-270.

Oostvogels, V.J., B. Dumont, H.J. Nijland, I.J.M. De Boer, and R. Ripoll-Bosch (2024). 'What about the negatives? An integrated framework for revealing diverse values of nature and its conservation.' *People and Nature* 6: 2633-2646.

Otsuki, K. (2015) *Transformative sustainable development: Participation, reflection and change*. Abingdon: Routledge.

Pansardi, P. (2012) 'Power to and power over: Two distinct concepts of powers?' *Journal of Political Power* 5: 73-89.

Parsons, T. (1963) 'On the concept of political power.' *Proceedings of the American Philosophical Society* 107: 232-262.

Pascual, U., P. Balvanera, S. Díaz, G. Pataki, E. Roth, M. Stenseke, R.T. Watson, E. Basak Dessane, M. Islar, E. Kelemen, V. Maris, M. Quaas, S.M. Subramanian, H. Wittmer, A. Adlan, S. Ahn, Y.S. Al-Hafedh, E. Amankwah, S.T. Asah, P. Berry, A. Bilgin, S.J. Breslow, C. Bullock, D. Cáceres, H. Daly-Hassen, E. Figueroa, C.D. Golden, E. Gómez-Baggethun, D. González-Jiménes, J. Houdet, H. Keune, R. Kumar, K. Ma, P.H. May, A. Mead, P. O'Farrell, R. Pandit, W. Pengue, R. Pichis-Madruga, F. Popa, S. Preston, D. Pacheco-Balanza, H. Saarikoski, B.B. Straasburg, M. van den Belt, M. Verma, F. Wickson, and N. Yagi (2017). 'Valuing nature's contributions to people: The IPBES approach.' *Open Issue* 26-27: 7-16.

Patterson, J., K. Schulz, J. Vervoort, S. van der Hel, O. Widerberg, C. Adler, M. Hurlbert, K. Anderton, M. Sethi, and A. Barau (2017). 'Exploring the governance and politics of transformations towards sustainability.' *Environmental Innovation and Societal Transitions* 24: 1-16.

Pereira, L., G.R. Asrar, R. Bhargava, L.H. Fisher, A. Hsu, J. Jabbour, J. Nel, O. Selomane, N. Sitas, C. Trisos, J. Ward, M. van den Ende, J. Vervoort, and A. Weinfurter (2021). 'Grounding global environmental assessments through bottom-up futures based on local practices and perspectives.' *Sustainability Science* 16: 1907-1922.

Pereira, L.M., K.K. Davies, E. den Belder, S. Ferrier, S. Karlsson-Vinkhuyzen, H. Kim, J.J. Kuiper, S. Okayasu, M.G. Palomo, H.M. Pereira, G. Peterson, J. Sathyapalan, M. Schoolenberg, R. Alkemade, S. Carvalho Ribeiro, A. Greenaway, J. Hauck, N. King, T. Lazarova, F. Ravera, N. Chettri, W.W.L. Cheung, R.J.J. Hendriks, G. Kolomytsev, P. Leadley, J.-P. Metzger, K.N. Ninan, R. Pichs, A. Popp, C. Rondinini, I. Rosa, D. van Vuuren, and C.J. Lindquist (2020). 'Developing multiscale and integrative nature-people scenarios using the Natures Futures Framework.' *People and Nature* 2: 1172-1195.

Pickering, J., B. Coolsaet, N. Dawson, K.M. Suiseeya, C.Y.A. Inoue, and M. Lim (2022). 'Rethinking and upholding justice and equity in transformative biodiversity in governance', in: *Transforming biodiversity governance*, eds. I.J. Visseren-Hamakers and M.T.J. Kok, 155-178. Cambridge: Cambridge University Press.

Pigott, A. (2018) 'Imagining socioecological transformation: An analysis of the Welsh government's policy innovations and orientations to the future.' *Elementa: Science of the Anthropocene* 6: 60.

Puig de la Bellacasa, M. (2017) *Matters of Care: Speculative Ethics in More than Human Worlds*. Minneapolis: University of Minnesota Press.

Raudsepp-Hearne, C., G.D. Peterson, E.M. Bennett, R. Biggs, A.V. Norström, L. Pereira, J. Vervoort, D.M. Iwaniec, T. McPhearson, P. Olsson, T. Hichert, M. Falardeau, and A.J. Aceituno (2020).

'Seeds of good anthropocenes: Developing sustainability scenarios for northern Europe.' *Sustainability Science* 15: 605-617.

Raworth, K. (2017) *Doughnut economics: Seven ways to think like a 21st-century economist.* London: Random House.

Raymond, C.M., C.B. Anderson, S. Athayde, A. Vatn, A.M. Amin, P. Arias-Arévalo, M. Christie, M. Cantú-Fernández, R.K. Gould, A. Himes, J.O. Kenter, D. Lenzi, B. Muraca, R. Murali, S. O'Connor, U. Pascual, S. Sachdeva, A. Samakov, and E. Zent (2023). 'An inclusive typology of values for navigating transformations towards a just and sustainable future.' *Current Opinion on Environmental Sustainability* 64.

Rip, A., and R. Kemp (1998). 'Technological change', in: *Human choice and climate change: Vol. II, resources and technology,* eds. Rayner, S., Malone, E.L., 237-399. Columbus: Battelle Press.

Ruano-Chamarro, C., G.G. Gurney, and J.E. Cinner (2022). 'Advancing procedural justice in conservation.' *Conservation Letters* 15.

Rutting, L., M. Veeger, R. von Breymann, U. Garcia, N. Sancir, S. Calel, F. Canek, M. Suyuk, and J. Vervoort (2024a). 'Prosperous futures inspired by prosperous pasts: Fostering imagination of radical food system alternatives in Guatemala.' *Current Research in Environmental Sustainability* 8.

Rutting, L., J. Vervoort, H. Mees, and P. Driessen (2024b). 'Breaking out of conventions: How scenario planners can increase their reflexivity regarding societal imaginaries.' *Futures* 160.

Rutting, L., J. Vervoort, H. Mees, and P. Driessen (2022). 'Strengthening foresight for governance of social-ecological systems: An interdisciplinary perspective.' *Futures* 141.

Rutting, L., J. Vervoort, H. Mees, L. Pereira, M. Veeger, K. Muiderman, A. Mangnus, K. Winkler, P. Olsson, T. Hichert, R. Lane, B. Bottega Pergher, L. Christiaens, N. Bansal, A. Hendriks, and P. Driessen (2023). 'Disruptive seeds: A scenario approach to explore power shifts in sustainability transformations.' *Sustainability Science* 18: 1117-1133.

Saritas, O., S. Burmaoglu, and D. Ozdemir (2022). 'The evolution of foresight: What evidence is there in scientific publications?' *Futures* 137.

Schapper, A., C. Hoffmann, and P. Lee (2022). 'Procedural rights for nature – A pathway to sustainable decarbonisation?' *Third World Quarterly* 43: 1197-1216.

Schlosberg, D. (2007) *Defining environmental justice: Theories, movements, and nature.* Oxford: Oxford University Press.

Schoemaker, P. J. H., and P.E. Tetlock (2012). 'Taboo Scenarios: How to think the unthinkable.' *California Management Review* 54(2).

Scoones, I., A. Stirling, D. Abrol, J. Atela, L. Charli-Joseph, H. Eakin, A. Ely, P. Olsson, L. Pereira, R. Priya, P. van Zwanenberg, and L. Yang (2020). 'Transformations to sustainability: Combining structural, systemic and enabling approaches.' *Current Opinion in Environmental Sustainability* 42: 65-75.

Sharpe, B., A. Hogdson, G. Leicester, A. Lyon, and I. Fazey (2016). 'Three horizons: A pathways practice for transformation.' *Ecology and Society* 21.

Shepherd, A., and C. Bowler (1997). 'Beyond the requirements: Improving public participation in EIA.' *Journal of Environmental Planning and Management* 40: 725-738.

Shiva, V. (1992) Women's Indigenous Knowledge and Biodiversity Conservation. *India International Centre Quarterly*, *19*(1/2), 205–214.

Smith, S.L. (2012) 'Toward inclusive co-management: Factors influencing stakeholder participation.' *Coastal Management* 40: 327-337.

Spijkers, J., A. Merrie, C.C.C. Wabnitz, M. Osborne, M. Mobjörk, Ö. Bodin, E.R. Selig, P. le Billon, C.S. Hendrix, G.G. Singh, P.W. Keys, and T.H. Morrison (2021). 'Exploring the future of fishery conflict through narrative scenarios.' *One Earth* 4: 386-398.

Stenseke, M., J.A. Olsson, S. Arvidsson, N. Droste, V. Elliot, L. Gipperth, and H.G. Smith (2025). 'Defining and operationalising 'nature-positive' – A question of power.' *Current Opinion in Environmental Sustainability* 77.

Stevis, D., and R. Felli (2020). 'Planetary just transition? How inclusive and how just?' *Earth Systems Governance: Exploring Planetary Justice* 6.

Stirling, A. (1999) 'The appraisal of sustainability: Some problems and possible responses.' *Local Environment* 4: 111-135.

Taherzadeh, O., H. Cai, and J.M. Mogollón (2026). 'Small farms contribute a third of the food consumed in high-income nations.' *Nature Food* 7: 66-73.

Taylor, C. (2004) *Modern Social Imaginaries.* Durham: Duke University Press.

Tebboth, M.G.L., R. Carmenta, A. Minas, A. Adelekan, X. Cao, A. Fullonton, C. Kinally, N.L. Cataldo, S. Mander, and C. Shelton (2025). 'The "how" of transformation: Principles for a justice-centred response to the climate and biodiversity crises.' *Environmental Science and Policy for Sustainable Development* 67: 7-23.

Tedesco, A.M., S. López-Cubillos, R. Chazdon, J.R. Rhodes, C.L. Archibald, K.-V. Pérez-Hämmerle, P.H.S. Brancalion, K.A. Wilson, M. Oliveira, D.F. Correa, L. Ota, T.H. Morrison, H.P. Possingham, M. Mills, F.C. Santos, and A.J. Dean (2023). 'Beyond ecology: Ecosystem restoration as a process for social-ecological transformation.' *Trends in Ecology & Evolution* 38: 643-653.

Termeer, C.J.A.M., and A. Dewulf (2019). 'A small wins framework to overcome the evaluation paradox of governing wicked problems.' *Policy and Society* 38: 298-314.

Termeer, C.J.A.M., A. Dewulf, and G.R. Biesbroek (2017). 'Transformational change: Governance interventions for climate change adaptation from a continuous change perspective.' *Journal of Environmental Planning and Management* 60: 558-576.

Termeer, K., A. Dewulf, and R. Biesbroek (2024). 'Three archetypical governance pathways for transformative change toward sustainability.' *Current Opinion in Environmental Sustainability* 71.

Turnhout, E. (2024) 'A better knowledge is possible: Transforming environmental science for justice and pluralism.' *Environmental Science and Policy* 155.

Turnhout, E., and M. Lahsen (2022). 'Transforming environmental research to avoid tragedy.' *Climate and Development* 14: 834-838.

Tuteur, N.M. (2022) 'Reframing Kanawai: Towards a restorative justice framework for Indigenous peoples.' *Indigenous Peoples' Journal of Law, Culture and Resistance* 7.

Ulrich, W., and M. Reynolds (2020). 'Critical system heuristics: The idea and practice to boundary critique', in: *Systems approaches to making change: A practical guide,* eds. M. Reynolds and S. Holwell, 255-306. London: Springer.

UNRISD (2022). *Crises of inequality: Shifting power for a new eco-social contract.* Geneva: United Nations.

Van Dam, F., L. Pols, M. Schoolenberg, and C. Veerkamp (2024). *Naar een breder gedragen natuurbeleid in Nederland.* The Hague: PBL Netherlands Environmental Assessment Agency.

Van Lente, H., and P. Peters (2022). 'The future as aesthetic experience: Imagination and engagement in future studies.' *European Journal of Futures Research* 10: 16.

Van Megen, L., and B.P. Anthony (2024). 'Exploring community-based wildlife tourism from an environmental justice perspective: A case study of the wild olive tree camp in South Africa.' *Human Ecology* 52: 1187-1201.

Van Oorschot, M., M. Kok, and R. Van Tulder (2020). *Business for biodiversity – Mobilising business towards net positive impact.* The Hague: PBL Netherlands Environmental Assessment Agency.

Van Rijnsoever, F.J., and J. Leendertse (2020). 'A practical tool for analysing socio-technical transitions.' *Environmental Innovation and Societal Transitions* 37: 225-237.

Veerkamp, C., M. Schoolenberg, F. van Rijn, and T. Dassen (2023). *Natuur in en om de stad.* The Hague: PBL Netherlands Environmental Assessment Agency.

Vervoort, J., T. Smeenk, I. Zamuruieva, L. Reichelt, M. Van Veldhoven, L. Rutting, A. Light, L. Houston, R. Wolstenholme, M. Dolejsová, A. Jain, J. Ardern, R. Catlow, K. Vaajakallio, Z. Falay von Flittner, J. Putrle-Srdic, J. Lohmann, C. Moossdorff, T. Mattelmäki, C. Ampatzidou, J.H. Choi, A. Botero, K. Thompson, J. Torrens, R. Lane, and A. Mangnus (2024). '9 Dimensions for evaluating how art and creative practice stimulate societal transformations.' *Ecology and Society* 29.

Vervoort, J., L. van Haasbergen, and A. Beaudoin (2025). *Visioning and societal transformation.* Utrecht: Utrecht University.

Vervoort, J., R. Bendor, A. Kelliher, O. Strik, and A. Helfgott (2015). 'Scenarios and the art of worldmaking.' *Futures* 74: 62-70.

Visseren-Hamakers, I.J, and M.T.J. Kok (2022). *Transforming biodiversity governance.* Cambridge: Cambridge University Press.

Visseren-Hamakers, I.J., B. Cashore, D. Loorbach, M.T.J. Kok, S. de Koning, P. Vullers, A. van Veen (2022). 'How to save a million species? Transformative governance through priotisiation', in: *Transforming biodiversity governance*, eds. I.J. Visseren-Hamakers and M.T.J. Kok, 67-90. Cambridge: Cambridge University Press.

Vogel, C., and K. O'Brien (2022). 'Getting to the heart of transformation.' *Sustainability Science* 17: 653-659.

Waddock, S. (2025) 'Eco-social narratives for awakening an era of transformative change.' *Humanistic Management Journal* 10: 11-29.

Westley, F., and K. McGowan (2017). *The evolutions of social innovation: Building resilience through transitions.* Cheltenham: Edward Elgar Publishing.

Whyte, K. (2017) 'Indigenous climate change studies: Indigenising futures, decolonising the Anthropocene.' *English Language Notes* 55: 153-162.

Wiebe, K., M. Zurek, S. Lord, N. Brzezina, G. Gabrielyan, J. Libertini, A. Loch, R. Thapa-Parajuli, J. Vervoort, and H. Westhoek (2018). 'Scenario development and foresight analysis: Exploring options to inform choices.' *Annual Review of Environment and Resources*.

Wijsman, K., K. Bogner, F. Avelino, A. Kalfagianni, and C.U. Weis (2026). 'Towards a lexicon for just sustainability transitions: Thinking with capabilities, epistemology, intersectionality, spatiality, and temporality.' *Environmental Innovation and Societal Transitions* 59.

Wijsman, K., and M. Feagan (2019). 'Rethinking knowledge systems for urban resilience: Feminist and decolonial contributions to just transformations.' *Environmental Science and Policy* 98: 70-76.

Wittmayer, J.M., I. Campos, F. Avelino, D. Brown, D. Doracic, M. Fraaije, S. Gährs, A. Hinsch, S. Assalini, T. Becker, E. Marín-González, L. Holstenkamp, R. Bedoic, N. Duic, S. Oxenaar, and T.

Puksec (2022). 'Thinking, doing, organising: Prefiguring just and sustainable energy systems via collective prosumer ecosystems in Europe.' *Energy Research & Social Science* 86.

Yanow, D. (2009) 'Ways of knowing: Passionate humility and reflective practice in research and management.' *American Review of Public Administration* 39: 579-601.

Zimmermann, A., J.O. Kenter, and P. Wood (2026). 'Values, emotions and views of the future: Democratic deliberation as pathway to inner transformation.' *Sustainability Science*.