

# Utrecht University Repository

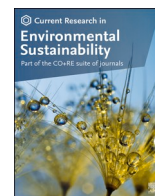
Title	Prosperous futures inspired by prosperous pasts: Fostering imagination of radical food system alternatives in Guatemala
Authors	Rutting, Lucas; Veeger, Marieke; von Breymann, Randolph; Garcia, Ubaldino; Sancir, Norma; Calel, Sandra; Canek, Fredy; Suyuk, Miriam; Vervoort, Joost
Published in	Current Research in Environmental Sustainability
Publication Date	2024-11-23
Link	<a href="https://dspace.library.uu.nl/handle/1874/474247">https://dspace.library.uu.nl/handle/1874/474247</a>
Citation	Rutting, L, Veeger, M, von Breymann, R, Garcia, U, Sancir, N, Calel, S, Canek, F, Suyuk, M & Vervoort, J 2024, 'Prosperous futures inspired by prosperous pasts : Fostering imagination of radical food system alternatives in Guatemala', Current Research in Environmental Sustainability, vol. 8, 100270. <a href="https://doi.org/10.1016/j.crsust.2024.100270">https://doi.org/10.1016/j.crsust.2024.100270</a>
Versions / License	Publisher version
Rights	<a href="https://www.uu.nl/en/university-library/license-and-reuse-conditions">https://www.uu.nl/en/university-library/license-and-reuse-conditions</a>



ELSEVIER

Contents lists available at ScienceDirect

# Current Research in Environmental Sustainability

journal homepage: [www.sciencedirect.com/journal/current-research-in-environmental-sustainability](http://www.sciencedirect.com/journal/current-research-in-environmental-sustainability)

## Prosperous futures inspired by prosperous pasts: Fostering imagination of radical food system alternatives in Guatemala

Lucas Rutting<sup>a,b,\*</sup>, Marieke Veeger<sup>a,b</sup>, Randolph von Breymann<sup>a,b</sup>, Ubaldino Garcia<sup>c</sup>, Norma Sancir<sup>c</sup>, Sandra Calel<sup>d</sup>, Fredy Canek<sup>e</sup>, Miriam Suyuk<sup>f</sup>, Joost Vervoort<sup>g</sup>

<sup>a</sup> Alliance Bioversity International – CIAT, Rome, Italy

<sup>b</sup> Conexión, Ciudad Guatemala, Guatemala

<sup>c</sup> Maya Ch'orti' Indigenous Council of Olopa, Chiquimula, Guatemala

<sup>d</sup> Verapaz Union of Peasant Organizations (UVOC), Verapaz, Guatemala

<sup>e</sup> Association of Forest Communities of Petén (ACOFOP), Petén, Guatemala

<sup>f</sup> Coordination of NGOs and Cooperatives (CONGCOOP), Ciudad de Guatemala, Guatemala

<sup>g</sup> Copernicus Institute of Sustainable Development, Utrecht University, Utrecht, the Netherlands

### ARTICLE INFO

#### Keywords:

Food systems  
Guatemala  
Transformation  
Scenario planning  
Indigenous people  
Power shifts

### ABSTRACT

Transformations imply the need for radical alternatives to current realities. This requires a fundamental reimagination of current systems. Different future-oriented practices specifically designed for the imagination of transformations have emerged in recent years, including the Disruptive Seeds approach (DS). DS focuses on innovative bottom-up initiatives (seeds), that show potential to grow in impact and challenge unsustainable systems, contributing to transformative change. This paper reports on the first time DS was applied in practice, as part of a project focusing on food systems transformation in Guatemala. Working primarily with Indigenous actors representing smallholder communities, DS shows great potential when it comes to emphasizing their perspectives and objectives in the imagination of desired futures. Tapping into marginalized perspectives and sources of knowledge, it can help advance the conceptualization of transformative change that truly contributes to social equity and justice. Moreover, the approach facilitates an inclusive platform for articulating and interrogating power dynamics. Initially developed and tested in Global Northern contexts, the DS approach demonstrates adaptability across diverse contexts, including Indigenous communities in the Global South. Findings underscore the transformative potential of collective imagination rooted in Indigenous worldviews, offering alternatives to unsustainable and unjust realities, challenging dominant narratives and contributing to more just and sustainable futures. More generally, it demonstrates huge potential for imagining transformations, challenging dominant political structures and imaginaries, emphasizing issues of social justice and equity. It shows the value of incorporating the knowledge, perspectives, values and imaginaries of—often marginalized—communities into conversations about sustainability transformations.

### 1. Introduction

Today's world is facing multiple intertwined global crises—accelerating climate change, biodiversity loss, social inequity, growing geopolitical tensions and more (e.g., Rockström et al., 2009; Westley et al., 2011; Piketty and Saez, 2014; Steffen et al., 2015). The concept of transformation—of which different definitions have been formulated, all referring to some sort of fundamental societal shift (e.g., Leach et al., 2010; Olsson et al., 2014; Stirling, 2015; Feola, 2015; Patterson et al., 2017)—has gained traction as the only way to effectively deal with these

grand and complex challenges. Incremental adaptation—or “marginal changes over time within existing system parameters” (Dilling et al., 2023:1)—is insufficient, such is the reasoning (e.g., Kates et al., 2012; Park et al., 2012; Dowd et al., 2014). Transformations imply the need for radically different alternatives to current realities. A fundamental reimagination of current systems is required—this allows us to redesign them in ways that prioritize regenerative and equitable solutions over current models that may inadvertently sustain unsustainable practices (Milkoreit, 2017; Moore and Milkoreit, 2020). In other words, imagination is a crucial capacity for engaging with deliberate

\* Corresponding author at: Alliance Bioversity International – CIAT, Rome, Italy.

E-mail address: [l.rutting@cgiar.org](mailto:l.rutting@cgiar.org) (L. Rutting).

<https://doi.org/10.1016/j.crsust.2024.100270>

Received 14 June 2024; Received in revised form 13 November 2024; Accepted 14 November 2024

Available online 23 November 2024

2666-0490/© 2024 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

transformational change (Moore and Milkoreit, 2020). Different future-oriented practices specifically designed for the imagination of transformations have emerged in recent years (e.g., Bennett et al., 2016). Practices that connect emancipatory movements and scholarship to speculative futures research, the arts and philosophy of science are generating imagined futures that have the potential to inform deliberate transformative change (Galafassi et al., 2018; Moore and Milkoreit, 2020). Significantly, many of these imaginations share a rejection of Western, apocalyptic “end of the world” narratives, which are criticized as a privileged form of imagination that ignores the fact that a sizable part of humankind has endured and eventually survived colonialism, slavery, systemic oppression, etcetera (Whyte, 2018; Mitchell and Chaudhury, 2020).

It is important to acknowledge that processes of collective imagination of possible and desirable futures are inherently political. Certain actors groups have more power in societies than others, and part of this is ‘prefigurative power’, i.e., the capacity of prefiguring new ways of doing, thinking and organizing (Wittmayer et al., 2022)—their conceptions of the future are often dominant over those of less powerful actors—and these power dynamics are often not perceived or recognized (Bourdieu, 1991; Swartz, 2013; Jasanoff and Kim, 2015; Bellamy and Lezaun, 2017; Miller and Wyborn, 2020). Often, such dominant conceptions of the future align with dominant societal imaginaries. Imaginaries, in this regard, can be defined as collectively held, often institutionally stabilized, and publicly performed visions of the present and future (Castoriadis, 1975; Taylor, 2002; Jasanoff and Kim, 2009; Milkoreit, 2017). In the discourse of international agricultural development research, for example, hegemonic Western and technocratic imaginaries about sustainable growth often override other perspectives (e.g., Escobar, 1995; Feldman and Biggs, 2012; Patel, 2013; Rutting et al., 2024). Conversely, imagination also has the potential to challenge and break hegemonic conceptions of future trajectories (Moore and Milkoreit, 2020). Furthermore, imagining transformations inevitably entails imagining shifts in power (Gaventa, 2006; Scoones et al., 2015; Avelino, 2017; Rutting et al., 2023). This means that attending to power is crucial for multiple reasons when engaging with imagination of transformative change.

An example of an approach that aims to facilitate the imagination transformative futures is the Seeds of Good Anthropocenes (SoGA) approach (Bennett et al., 2016). In this approach, ‘Seeds’ are initiatives that exist in the margins of current systems but can provide the basis for imagining transformation pathways toward radically different futures. Building on this approach, Rutting et al. (2023) sought to make the role of power dynamics more explicit, introducing the notion of ‘Disruptive Seeds’ to characterize Seed initiatives that explicitly seek to challenge current power dynamics. Disruptive Seeds combines SoGA with scholarship on the role of power in transitions and transformations (e.g., Avelino, 2017; Brisbois, 2019; Feola, 2019) to not only focus on Seeds that engage with power challenges but to ask guiding questions around power shifts in system transformations as well.

In this paper we report on the first time the Disruptive Seeds (DS for short) approach has been applied in practice: in a participatory process for envisioning food system transformations in Guatemala, as part of the CGIAR Research Initiative on Climate Resilience (also known as ClimBeR). We chose to focus on applying the DS approach in the context of the food system of Guatemala, a country characterized by longstanding inequalities. Especially rural areas face severe food and land tenure insecurity, as well as environmental degradation, while government policies have promoted large-scale monocultures and extractive industries that contribute to the worsening of these challenges and often disregard Indigenous land rights (Ybarra, 2011; Rice et al., 2023; Alonso-Fradejas, 2015). Meanwhile, grassroots movements have emerged who advocate for food sovereignty and agroecological approaches rooted in Indigenous knowledge, seeking to counter the impacts of neoliberal policies (Copeland, 2019; Alonso-Fradejas, 2012).

We aim to investigate how the DS approach can foster transformative

imagination through an emphasis on the role of power in transformations. As a second objective, we seek to understand how the DS approach can put the perspectives and ideas of marginalized and Indigenous communities front and center. We do so by adopting a co-production approach, involving members of Indigenous communities in the research. As such, the author team consists of researchers and Guatemalan collaborators, to ensure the paper is grounded and justly framed in terms of the Indigenous Guatemalan context.

## 2. Theory: imagining transformative change

Following Stirling (2015) and Patterson et al. (2017), we define transformations as “a form of radical, complex, and dynamic change in social, political, cultural, institutional, technological, and ecological sub-systems, or a shift from an existing, untenable system to a fundamentally new one, and such a transformations can be either deliberate or emergent” (Rutting et al., 2023:16). The role of diverse and emergent political alignments, actively challenging incumbent structures and actors, is crucial (Stirling, 2015).

In this paper we examine how the imagination of food system transformations can be fostered by the DS approach. Food systems are—in essence—social-ecological systems (SES), in which different groups of actors are interacting with other sub-systems, and competing and collaborating with one another—they each have their own perspectives, framings and stakes with regard to the system (Midgley, 2000; Dewulf et al., 2004; Smith and Stirling, 2010; Helfgott, 2018; Rutting et al., 2021). As a consequence, power dynamics between these actor groups play a key role. However, the role of power dynamics has remained rather under-investigated in research on governance of social-ecological systems (Clement, 2010). Over the last twenty years, a body of work has emerged that critiques this lack of attention to power dynamics (e.g., Nadasdy, 2007; Hornborg, 2009; Meadowcroft, 2009; Davidson, 2010; Smith and Stirling, 2010; Voß and Bornemann, 2011; Davoudi, 2012), and scholars have called for research on empowering marginalized groups and power dynamics in environmental governance more generally (e.g., Burch et al., 2019). Recently, Fisher et al. (2022) explored how the social sciences play a role in “elaborating on the politicization and pluralization of transformation processes” (Fisher et al., 2022:1) in a piece introducing a special issue that included research addressing the role of power in transformations (Bastiaansen et al., 2021). In addition, research with a specific focus on power in food systems, for example from the perspective of political economy, provides important insights into power relations across the different aspects of food systems and its interaction with social and ecological systems (e.g., Duncan et al., 2019).

### 2.1. The role of imagination in transformations

Moore and Milkoreit (2020) posed a number of questions regarding the role of imagination in transformations, of which two are of particular interest to this paper: what is the relationship between imagination, power and governance, and how do the politics of imagination shape sustainability transformations? Imagination can be regarded as a form of resistance to current realities, especially for marginalized communities, as it enables them to assert their identities, values, and autonomy, despite oppressive realities, and allows them to envision worlds that defy oppression, sustain cultural values, and propose viable alternatives (Escobar, 2008; Whyte, 2018). In addition, it is important to note that imagination is informed by people’s perspectives, values, knowledge and ideas (Inayatullah, 2002; Vervoort and Gupta, 2018). As such, imagination can be regarded as “key for social change processes” and a necessary resource for transformative change (Moore and Milkoreit, 2020:2). It can challenge hegemonic views of the present and future as the only ‘possible’ reality (Anderson, 2016). However, the content of imagination is affected and influenced by the individual’s social, cultural and political embeddedness. This is what Stoetzler and Yuval-Davis

(2002) call *situated imagination*: an individual's imagination exists in the context of wider, societal imaginaries, i.e. collectively held and institutionally stabilized vision of the present and future (Castoriadis, 1975; Taylor, 2002; Milkoreit, 2017). Thus dominant, hegemonic imaginaries can restrict or enhance a person's transformational imagination. In other words, imaginaries can be seen as the "providing the grounds of possibility for transformation" (Pigott, 2018:13)—but it follows that dominant imaginaries also provide important limits to what can be imagined; and that imagination itself is often a force of hegemonic domination and restriction rather than a force of liberation.

To counter the ways in which imagination tends to reinforce existing power structures, we argue for the need to center the imaginaries of marginalized and vulnerable communities in processes that attempt transformative imagination. We contend that explicitly claiming space for and tapping into marginalized sources of knowledge, perspectives and imaginaries can advance the conceptualization of transformative change that truly contributes to social equity and justice, and can provide the basis for critiquing hegemonic ideas that are often taken for granted – and coming to truly alternative imagined futures in the process.

## 2.2. The politics of imagination

Practices of collective imagination of futures, often referred to as participatory foresight, are often regarded as technocratic and value-free tools that can help to set shared objectives or common goals for desirable futures or to address future uncertainty. As such, these practices are generally framed as neutral, science-based and apolitical (Inayatullah, 2002; Stirling, 2015; Vervoort and Gupta, 2018). They are, in other words, often depoliticized (Louis and Maertens, 2021), while they *are* inherently political: the imagination of different groups of stakeholders is the product of their different ideas, values and perspectives that often compete with one another (Inayatullah, 2002; Vervoort and Gupta, 2018). Perceiving practices of collective imagination as politically neutral is problematic, as this can contribute to uncritical reproduction of dominant perspectives and imaginaries. And moreover, futures processes often lack a deeper analysis of class, gender and race in their attempts at inclusiveness (Barendregt et al., 2024).

In response, futures scholars and activists interested in futures have increasingly called for the need for explicitly pluralistic futures (e.g., Vervoort et al., 2015; Beling et al., 2018; Escobar, 2018; Terry et al., 2024). This also pertains to social differences within, for example, Indigenous groups and related internal power dynamics (see e.g., Hale, 2002; Albó, 2004; Lucero, 2008). Escobar contends that a *pluriversal* stance toward the world is crucial, which is to acknowledge that there is a plurality of worldviews in society, and, as a consequence, multiple worlds exist simultaneously (Vervoort et al., 2015; Escobar, 2018). In addition, such a pluriversal position can open up governance processes to alternative discourses and marginalized voices (Beling et al., 2018). This can include other conceptions of time and how pasts relate to futures (Terry et al., 2024). Crucially, work on alternative futures is very much alive in activist spaces (Rodríguez et al., 2024; Hawlina et al., 2020) that combine action and imagination organically, and the same goes for artistic practices that cross over with futures work and activist action (Streeby, 2018; Vervoort et al., 2024). There has been a specific push toward the development of Indigenous futures approaches, including by dedicated organizations (e.g., Indigenous Futures Research Centre and Initiative for Indigenous Futures). Mitchell and Chaudhury (2020) emphasize the importance of who imagines futures and "with whose flourishing in mind" (ibid.:311), as, they argue, "imaginaries create worlds, so it greatly matters whose are privileged, and whose are excluded" (ibid.:313). Interestingly, they point out that while Western imaginations of futures often perceive rupture as a threat to incumbent power and security structures, Black, Indigenous and People of Color (BIPOC) futurisms tend to embrace change and disruption, as the structures that are challenged are often the ones that oppress BIPOC

(Mitchell and Chaudhury, 2020). As examples, they describe Afro-futurism, Indigenous futurisms, and Asian futurism, that in their own specific ways combine resistance against ongoing forms of oppression with ancestral knowledge and forms of governance, and their cosmologies with science fiction, the arts and plural future worlds (Ibid.).

## 2.3. The disruptive seeds approach

In response to a perceived lack of explicit attention to power dynamics in SoGa (Raudsepp-Hearne et al., 2019), Rutting et al. (2023) adapted the approach and incorporated a focus on power dynamics and shifts in transformations. In the DS approach, power is defined as actors' capacity to realize objectives (Avelino and Rotmans, 2009; Avelino, 2017), and to mobilize the resources needed to achieve those objectives (Parsons, 1967; Pansardi, 2012). The DS approach integrates insights from scholarship on power shifts in transformations, i.e., the *Power in Transition* framework (Avelino, 2017), the *Powershifts* framework (Brisbois, 2019), and the *transition model canvas* (van Rijnsoever and Leendertse, 2020).

The *Power in Transition* framework differentiates between the incumbent systems (the regime), sources of change challenging the regime (niches), niches gaining momentum and challenging the incumbent system (niche-regimes), and exogenic macro-trends that either align with incumbents or not (the landscape) (Avelino, 2017). In her framework, Avelino distinguishes between transformative power (that changes the system), exercised by niches and niche-regimes, and reinforcing power (that keeps the system in place), exercised by the regime (Avelino and Rotmans, 2009, Avelino, 2017). Prefigurative power (Wittmayer et al., 2022), the power to imagine and realize futures, can be understood as a part of transformative power.

The *Powershifts* framework developed by Brisbois (2019) distinguishes three dimensions of power: instrumental, or direct and visible forms of power; structural, or the structures and institutions shaping the exercise of political power; and discursive power, referring to how the logic and discourse of social institutions, norms and values are constructed, expressed and reproduced, for example through the use of discursive tools (Brisbois, 2019).

The *transition model canvas*, developed by van Rijnsoever and Leendertse (2020) is a simple template for mapping key elements and interactions of transformations, i.e., the incumbent system and its strategies to maintain itself, and the niche system and the strategies it uses to destabilize the incumbent system (van Rijnsoever and Leendertse, 2020). Lastly, the DS approach incorporates the concept of *unmaking*, introduced by Feola (2019). Unmaking refers to the active deconstruction of modern capitalist imaginaries and social-ecological configurations, making space for radical alternatives that are incompatible with these capitalist structures (Feola, 2019; Feola et al., 2021).

Combining elements of these frameworks, the DS approach emphasizes niche practices that actively challenge, or *disrupt*, unsustainable incumbent actors and institutions. Based on the potential of DS practices, a vision of a desirable future is imagined, in which these DS have become part of a new regime, replacing the old, unsustainable one. Subsequently, a scenario, or *transformative pathway*, from the present toward that vision is constructed, with an emphasis on how the power shift from the current regime to a new, alternative regime unfolds (Rutting et al., 2023). In the development stage, the novel approach was tested in a series of participatory online pilot workshops and shows great potential in facilitating explicit and fruitful discussions about how power shifts may unfold in transformations (Rutting et al., 2023). Table 1 gives an overview of the questions used in DS aimed at guiding discussions and making explicit how power shifts in transformations unfold.

## 3. Methods

This study aims to analyze how the DS approach can foster

**Table 1**

The Disruptive Seeds approach: guiding questions for elucidating power shifts in transformations (Rutting et al., 2023).

Questions regarding the regime	Questions regarding the seed
What are the key elements and interactions of the incumbent system (the regime)?	What is the focus of the seed (niche system), what are its key elements? Think about both the elements that are currently present and the ones that are missing.
What unsustainable parts of the current dominant system (regime) need to go? (based on Feola et al., 2021)	What conflicts need to arise to make these unsustainable parts of the regime go? How can these elements and structures associated with the current regime be unmade?
How does the current regime exercise reinforcing power? What strategies does it use to defend itself/its structures?	How does the seed exercise transformative power? Strategies to destabilize the regime? Which resources are needed? How can this transformative power disrupt current regime structures?
What macro-trends are aligned with the regime?	How does the seed challenge dominant macro-trends? How does the seed strengthen counter-macro-trends? Synergisms?
Which actor groups are aligned with the regime?	Which actor groups align with the seed? How will people in the seeds organize? Who will support them? What are the roles of the relevant actors?
How will current problematic systems/actors defend themselves against change? How will they work to inhibit the seed?	How will actors aligned with the seed disrupt the current regime?
How does the regime use discursive tools such as the media?	How do actors aligned with the seed use discursive tools?
Does the regime employ coercion or manipulation? Who lobbies for the regime and how?	How can change be brought about through “playing by the rules” of the regime?
<i>Overarching questions:</i>	
How does this power shift happen? Describe the power struggles and shifts—how do we go from the current situation to the vision of the world in which the seed is dominant? Are there tipping points?	

transformative imagination. It draws on the application of the DS approach in a research project with stakeholders in the Guatemalan food system. As such, this paper reports on a process of co-production. In this section, we first introduce the study context: the Guatemalan food system. We then describe how we adopted a co-production approach for the research project in Guatemala. Next, we describe the phases of the research project, and lastly, we explain how we analyzed the project results in order to address our research objective.

### 3.1. Disruptive seeds and transformative food system pathways in Guatemala

This paper analyzes the first time the DS approach has been applied in a political practice context, as part of the CGIAR Research Initiative on Climate Resilience in Guatemala. This is a research-for-development initiative with the objective to prepare smallholder farmers across the Global South to be able to deal with the severe consequences of increased temperature, drought, flooding, and other climate extremes (CGIAR 2022). This way, it is intended to contribute to the CGIAR’s research portfolio aimed at transforming food, land, and water systems in a climate crisis. The DS project was initiated, with the objective of imagining bottom-up change from the perspective of actors that aim to change food systems by offering alternatives to the unsustainable status quo. The project started in Guatemala in 2022, is now applied in Kenya and will be applied in more countries (e.g., the Philippines).

Guatemala presents an interesting case for addressing this question. The country suffered from a civil war between the government and

different leftist rebel groups from 1960 to 1996, resulting in a genocide against the Maya population and widespread human rights violations (Navarro, 1999). Guatemala is characterized by deep-rooted inequalities that stem from pre-war colonial land concentration and still shape the economic and social landscape. Currently, a small elite still controls most of the wealth, while 55.1 % of the population lives in poverty (World Bank, 2024). Poverty is most pressing in rural areas, where food insecurity, climate vulnerability, environmental degradation, and land tenure insecurity prevail. Policies favoring large-scale monocultures focused on crops such as sugar, palm oil, and coffee, support export-oriented agriculture while undermining local food systems, further degrading ecosystems, and marginalizing smallholder communities (Ybarra, 2011; Rice et al., 2023; Alonso-Fradejas, 2015). Expansion of these monocultures, in combination with an increase of extractive industries (e.g., mining and hydroelectric projects) has exacerbated environmental degradation, including high levels of deforestation, soil erosion, and biodiversity loss. In addition, Indigenous land rights and governance structures are often ignored (Copeland, 2019; Alonso-Fradejas, 2012). The privatization of Indigenous lands in post-war Guatemala has increased tensions, displacing communities and eroding the spiritual and cultural connection to land essential to Indigenous identities (Ybarra, 2011).

Land conflicts and structural inequality in Guatemala have spurred grassroots movements advocating for land rights, food sovereignty, and local governance to challenge the dominance of big agribusinesses, often driven by foreign investments, and neoliberal policies (Alonso-Fradejas, 2015). These movements aim to build resilient, locally-driven food systems that resist neoliberal pressures and promote agroecological practices (Rice et al., 2023; Anderson et al., 2020). These agroecological approaches foster resilience through incorporating sustainable, cooperative ways of food production and connecting the defense of territory to environmental and food sovereignty (Copeland, 2019).

The election of Bernardo Arévalo and the center-left party Movimiento Semilla represents a potential shift in Guatemala’s governance. It marks a break with the country’s recent history of right-wing governments. The Arévalo administration claims to be committed to fight corruption, increase transparency and accountability of the public sector and address challenges regarding human development, infrastructure and economic inclusion (World Bank, 2024). However, the entrenched power structures and the elites’ resistance to change will pose a challenge to the administration’s reform agenda.

### 3.2. Co-production

For this research, we adopted a co-production approach, a collaborative research methodology aimed at actively involving stakeholders in all stages of research, including the development of methods, knowledge production (i.e., transformative pathways in this research), and analysis (Chambers et al., 2021). Co-production approaches are increasingly recognized for their potential to improve the inclusiveness and, therefore, the relevance and context-specific applicability of research outcomes by incorporating diverse perspectives and knowledge sources (Satterthwaite et al., 2024).

Co-production inspired by Indigenous perspectives prioritizes justice, respects Indigenous autonomy, and therefore allows for generating knowledge that is both ecologically attuned and socially equitable, which can inspire more sustainable and resilient futures (Jasanoff, 2004; Schlosberg and Carruthers, 2010; Whyte, 2017). It can foster inclusivity, and enhance diversity of knowledge through actively integrating Indigenous knowledge with scientific perspectives, leading to a more holistic understanding of issues of sustainability and social justice. Co-production involves mutual learning, in which Indigenous knowledge systems can offer insights into land stewardship, biodiversity, and resilience that are often overlooked by conventional Western approaches. It therefore fosters “epistemic pluralism,” which enhances sustainability research by valuing multiple ways of knowing (Jasanoff,

2004). Co-production also respects Indigenous self-determination, addressing historical power imbalances in research (Whyte, 2017). We chose this approach to ensure the project outcomes addressed stakeholders’ needs while integrating their unique knowledge, insights and expertise.

In this study, co-production centered on collaboration with 26 Guatemalan actors involved in DS initiatives—including 20 representatives of Indigenous and/or smallholder (or *campesino*) communities—as well as three government representatives (Veeger et al., 2023; see Appendix 1 for a list of participating organizations), taking into account Indigenous ways of knowing, respecting relational accountability, and prioritizing community-driven priorities (Smith, 2012; Wilson, 2008). Co-production here involves Indigenous participants not only as research subjects but as co-researchers who contribute to the development of transformative pathways, and analysis thereof, ensuring the relevance and appropriateness of the research for their communities (Louis, 2007). This approach aligns with decolonizing methodologies that seek to address power imbalances in research and involve Indigenous knowledge systems (Simonds and Christopher, 2013). Five Indigenous participants actively contributed to the conceptualization of this paper and the analysis and interpretation of the DS process in Guatemala and results.

The co-production process entailed building a relationship with DS representatives from the start, focusing on establishing trust and respecting Indigenous customs (Whyte, 2013; Berkes, 2012); allowing for a plurality of deliberation forms and perspectives during the participatory scenario workshops; the integration of traditional and/or Indigenous knowledge with scientific approaches for informing the development of transformative pathways (Laidler, 2006); and the development of actionable plans based on these pathways (David-Chavez and Gavin, 2018).

### 3.3. Project phases

The project consisted of four phases. Phase 1 was focused on identifying Disruptive Seeds in Guatemala; phase 2 on developing transformative pathways for Guatemala’s food system based on Disruptive Seeds; phase 3 on developing contextual, exploratory scenarios to test and strengthen the transformative pathways in the face of critical future uncertainties; and phase 4 focused on translating these pathways into actionable plans and/or informing existing policy processes to instigate transformative change. To this end, the co-production process was organized around a series of three workshops in Guatemala, the first in May 2023, the second in December 2023 and the last in March 2024. Each workshop addressed specific stages of the project: developing transformative pathways based on DS initiatives; developing explorative scenarios for testing the feasibility of the transformative DS pathways; and translating the transformative pathways into actionable plans. In this paper, we focus on the process and results of the first workshop, in which transformative pathways were developed inspired by DS initiatives (phase 2).

#### 3.3.1. Phase 1: identifying Disruptive Seeds in Guatemala

The project started with a context analysis around the Guatemalan food system and an initial search for food system-related Disruptive Seeds initiatives. In the first phase, disruptive seeds in Guatemala were identified through online searches, through engaging with key Guatemalan stakeholders including investigative journalists with networks of (Indigenous) smallholder farming communities, and field trips to different districts in Guatemala, engaging with local communities. In this phase, explaining the project’s initial objectives and building trust were crucial. Selection criteria for disruptive seeds included a focus on sustainable agriculture; actively challenging the unsustainable, incumbent agricultural regime (focused on production, monocultures, dominated by multinationals, neglecting local/regional values and practices, and ecological aspects); and have transformative potential. This resulted

in a database of more than 50 seed initiatives. Subsequently, a set of (partly overlapping) additional criteria was used to guide the prioritization of seeds that were invited to participate in the project (see Table 2).

This way, a range of Disruptive Seed initiatives were identified that broadly fit within four categories: community governance; defense and recovery of (Indigenous) communal lands and territory; agroecology; and social economy. Subsequently, the DS team had online and/or in-person meetings with representatives of these Seed initiatives, during which the DS approach and the initial project objectives were explained. Seed representatives showed interest in participating, as the objective of organizing themselves to bring about transformative change aligns with their own objectives, and because these objectives are put front and center. In close consultation with Seed actors, government representatives were invited, to ensure broad participation. This was contentious, since the project was initiated in 2022, when Alejandro Giammattei and his conservative Vamos party were still in power, whose regime was characterized by—sometimes violent—repression of opposition (Gatti, 2020). Seed actors were asked which parts of the government were open to dialogues about change. They indicated that especially representatives from the gender and Indigenous peoples offices would be likely to engage in constructive conversations. Thus, regional representatives of the Ministry of Agriculture, Livestock and Food (MAGA) and the Ministry of Environment and Natural Resources (MARN) concerned with gender and Indigenous Peoples’ rights were invited.

#### 3.3.2. Phase 2: developing transformative pathways for Guatemala’s food system

In May 2023, a group of actors representing these initiatives convened in a workshop in Panajachel, Guatemala, to engage in the DS scenario process. Participants were assigned breakout groups based on their seed category (Veeger et al., 2023; see Table 3 for key characteristics of participants; and Table 5 for breakout groups and workshop results). The workshop consisted of four steps. The first was to envision a future in which the seeds of the respective breakout groups have become dominant and thus, part of the new regime. During this step, participants thought of what these seeds would look like in their “mature” form (i.e., when they have become dominant and flourish as part of a new regime), as well as what this means for the world in which these seeds exist: who are winners and losers of this particular future in Guatemala? What further impacts would this have? The second step was to explore and explain how power shifts will take place that are required for the transformation from the current situation to the future envisioned during step 1. During this second step, the Three Horizons framework (Sharpe et al., 2016)—a simple and intuitive means of visualizing transformations—was used to guide deliberations between participating stakeholders. Moreover, the DS questions displayed in Table 1 were used to articulate how such transformations may actually unfold, through helping make explicit how power shifts happen. Next, a timeline and

**Table 2**  
Selection criteria for Seed initiatives.

Initial selection criteria	Additional criteria
Focuses sustainable agriculture	Challenges current power structures
Actively challenges the unsustainable, incumbent agricultural regime	Offers ideas for transformation (e.g., just or sustainable alternatives to current systems or practices)
Has transformative potential	Targets new forms of governance or institutional change
	Does it (in)explicitly target new forms of governance or institutional change?
	Focuses on women
	Focuses on youth
	Is led by or focused on Indigenous Peoples
	Operates in geographic areas prone to climate variability and extreme weather events

**Table 3**  
Key characteristics of workshop participants.

Characteristic	Number of participants
Gender	Male: 17 Female: 12
Representing Indigenous and/or smallholder (campesino) organizations and communities focused on traditional, sustainable agriculture	20
Representing non-Indigenous organizations focused on sustainable agriculture	6
Government representatives	3

scenario narrative from the present toward the vision were articulated, being mindful of different conceptions of time (e.g., circular and spiral). Finally, policy objectives were formulated derived from the desirable future visions. Together, these elements provided the basis for transformative pathways from the present to the respective future vision, with different phases in which actions to be taken and responsible actors were indicated.

**3.3.3. Phase 3: developing explorative scenarios and strengthening explorative pathways**

In December 2023, a second workshop was organized, in which the DS participants developed a set of explorative scenarios (see e.g., [Wiebe et al., 2018](#)) for Guatemala, i.e., different “what if?” stories about the future of Guatemala, each with its own unique opportunities and challenges. Through testing the feasibility of the transformative pathways in each of these hypothetical futures, it was aimed to strengthen their robustness in the face of future uncertainty.

**3.3.4. Phase 4: translating transformative pathways into actionable plans**

For the last phase of the project, a third in-person workshop as well as online consultations were organized, aimed at translating the transformative pathways into concrete action in the present and potentially informing existing policies, plans and investments of both governmental bodies and non-governmental organizations. This is an ongoing process.

**3.4. Analyzing and reflecting on workshop process, discussions and results**

In this paper, the team of authors aimed to address the main research objectives—1) to assess how the DS approach can foster transformative imagination and 2) to understand how the DS approach can put the perspectives and ideas of marginalized and Indigenous communities front and center—through reflecting on the workshop process, the discussions guided by the DS approach and the workshop results. We did so through reflective conversations guided by the framework for analysis introduced below.

As explained above, the DS approach builds on the notion that power shifts are crucial to sustainability transformations—incumbents exercise reinforcing power to maintain the current dominant regime, and transformational change only happens when this power is challenged by niches representing alternatives to the regime ([Avelino and Rotmans, 2009](#), [Avelino, 2017](#)). We therefore focus our analysis on how the approach enables transformative imagination with an emphasis on power—what types of power are challenged in the practice of collective imagination guided by the DS approach? In other words, we operationalize transformative imagination around power shifts from current, unsustainable regimes to new, just and sustainable regimes based on Disruptive Seed initiatives. A helpful framework in this regard was developed by [Rodriguez et al. \(2024\)](#), who distinguish different types of power that can be targeted by grassroots organizations aiming for transformative change, including institutional, legal, economic and political power; and power in discourse, narratives, values and worldviews, to which we add an—in our view—important concept: imaginaries. [Rodriguez et al. \(2024\)](#) formulated a number of strategies to

target each form of power. We translated and adapted these strategies into indicators for analyzing how the DS approach helps to foster transformative imagination, see [Table 4](#). In addition, we build on [Dey and Mason \(2018\)](#), who identified three necessary conditions to overcome—what they call—the “constraints of collective imagination” and to challenge and transform the “orthodox social imaginary”: a reflexive understanding of the dominant imaginary; the willingness to “provoke and transform” it; and the inventiveness, i.e., how imagination is used to overcome the limiting effects of the dominant imaginary ([Dey and Mason 2018](#)).

**4. Results**

The workshop results, organized according to these four steps, were documented in a workshop report. In addition, the author team conducted a round of internal reflections focusing on the insights of the authors who are part of the Guatemalan food system. Together, this constitutes the empirical base used for addressing this paper’s objective. The analysis was loosely guided by the analytical framework introduced above.

**4.1. Workshop results**

The results from the DS workshop focused on developing transformative pathways are summarized in [Table 5](#).

**4.2. General insights**

DS approach was considered highly relevant in the context of envisioning food systems transformations in Guatemala. Our co-author Miriam Suyuk of the Coordination of NGOs and Cooperatives (CON-GCOOP) contends that it made participants of the workshop reflect on “the reality of their lives and how more than 500 years of resistance has enabled them to survive and maintain their identity, knowledge and what they want to sustain.” She contends that “[...] The Guatemalan political, economic and cultural context has been dominated by this discourse of development. [...] The communities will not be defeated by these discourses, of development, or of positive economic spillover, or of green development, depending on the period. These discourses do not fit with the perspectives of the communities and peoples. [...] These

**Table 4**  
Indicators for analyzing transformative imagination.

Type of power	Indicators
Institutional, legal, economic, political power	<ul style="list-style-type: none"> <li>• Challenging existing frameworks and institutions</li> <li>• New, alternative institutions</li> <li>• Advocating human/political rights, ecosystem rights, plurality, cultural diversity</li> <li>• New modes of production and alternative technologies</li> </ul>
Discourse, narratives, values, worldviews and imaginaries	<ul style="list-style-type: none"> <li>• Reflexive understanding of dominant imaginary                             <ul style="list-style-type: none"> <li>o How society’s assumptions, beliefs, values, etc. limit and distort collective imagination by naturalizing particular worldviews</li> <li>o Does it provoke and transform the dominant imaginary?</li> <li>o Inventiveness: does the imagination overcome the limiting effects of the dominant imaginary?</li> </ul> </li> <li>• Interrogating apparent neutrality and potentially resulting exclusion</li> <li>• Introducing and/or revitalizing new/alternative knowledge                             <ul style="list-style-type: none"> <li>o Indigenous knowledge</li> <li>o Local knowledge</li> <li>o Contesting knowledge</li> </ul> </li> <li>• Construction of local views of futures</li> </ul>

**Table 5**  
Summary of workshop results (from Veeger et al., 2023).

Breakout group 1: Community governance	<p><i>Summarized vision inspired by Seeds:</i> Organic and sustainable agriculture are the norm, food sovereignty is ensured through the exclusive use of native seeds, encouraging crop diversification. Legitimate representative governance, inclusion, and equity are promoted through decision-making in assemblies, ensuring autonomy and organization. From a cosmogonic environmental vision, <i>pluriversities</i> are established based on ancestral knowledge that promote the integration of traditional knowledge and science</p> <p><i>Pathway name:</i> “Ixim Ulew, The Land of Corn: Story of a Green Dream”</p> <p><i>Key transformative developments in the pathway:</i> Exchange of experiences and knowledge; the fight against GMOs and recovery of native seeds (and establishing seed banks); recovery of community lands; establishment of an agrarian court; construction of a Plurinational State;</p> <p>Through structurally documenting and denouncing injustices, strengthening community organizations, and promoting inclusion and participation in decision-making at all levels, a shift in power structures has unfolded.</p>
Breakout group 2: Recovery and defense of land	<p><i>Policy objectives aligned with the pathway:</i> Ensure community Participation and representation; Secure community rights and recognition: Emphasize community organization and governance:</p> <p><i>Summarized vision inspired by Seeds:</i> A sustainable model of life based on the local, with the participation of the peoples, respecting the land as a sacred element, allowing a fair food system that protects native seeds and recovers the food culture of the peoples to guarantee food sovereignty for the country, and <i>Buen Vivir</i> for all.</p> <p><i>Pathway name:</i> “The Renaissance of Spring”</p> <p><i>Key transformative developments in the pathway:</i> Agrarian reform and reform of Guatemalan laws that guarantee respect for human rights and respect for nature; shift of power from political elites, monopolies and transnational corporations to a system in which laws and legislation are at the service of the population, ensuring the recovery of ancestral lands and social justice guided by principles of <i>Buen Vivir</i>.</p> <p><i>Policy objectives aligned with the pathway:</i> Reform the current justice system by modifying and updating the current constitution; reform laws related to land tenure, education and agriculture informed by ancestral knowledge; regulate land tenure in Guatemala; protect the genetics of Guatemala’s native seeds through specific regulations; promote regulations for the production and marketing of products from the perspective of the people; promote and respect the autonomous justice of the peoples who govern the ancestral lands according to the legacies of their territory and region.</p>
Breakout group 3: Social and <i>campesino</i> economy	<p><i>Summarized vision inspired by Seeds:</i> Food Sovereignty, recovery of ancestral knowledge, gender equality, economic empowerment, agroecology, policy committed to agriculture, local and national political advocacy, promoting biodiversity, circular economy, soil recovery and adaptation to climate change.</p> <p><i>Pathway name:</i> “Guatemala without hunger, with healthy ecosystems and socio-environmental and economic justice”</p> <p><i>Key transformative developments in the pathway:</i> when Guatemalan society was on the verge of collapse due to authoritarian rule and widespread corruption that co-opted decision-making. agroecology educational programs were implemented at the municipal and community levels Guatemalan society organized itself into regional technical roundtables, establishing an effective connection with civil society and adopting a</p>

**Table 5 (continued)**

Breakout group 4: Agroecology and food sovereignty	<p>community-based approach to decision-making University of Agroecology agrarian reform based on agroecological principles</p> <p><i>Policy objectives aligned with the pathway:</i> Implementation of agroecology educational programs; Creation of regional technical committees; Establishment of agroecology universities; Recovery of fertile and productive soils; Creation of native seed banks; Law on Development and Territorial Planning; Agrarian reform based on agroecological principles</p> <p><i>Summarized vision inspired by Seeds:</i> A Guatemala in which incentives for agroecological activities are abundant; with schools for gastronomy, agroecology and tourism; independent community economies; there is wealth in every smallholder community; Guatemala’s water resources are recovered; agrochemical-free agriculture; healthy and happy population</p> <p><i>Pathway name:</i> “Crear 502”</p> <p><i>Key transformative developments in the pathway:</i> Spurred by natural disasters and famines, a “green” revolution is started by the people of Guatemala who demand that the authorities take actions that prevent the degradation of natural resources, as well as the production of nutritious food free without the use of agro- and petrochemicals.</p> <p><i>Policy objectives aligned with the pathway:</i> Establishment of ANAPDE 2009 (National Association of Producers of Deciduous Fruit Trees) which ensures that import taxes are invested in domestic, organic production; Promote laws that encourage the reduction of greenhouse gases and forestry or agroforestry incentives; Sign agreements with politicians aspiring to be president to ensure that their governance plans comply with the commitments related to the environment, agriculture, etc., which were agreed upon during their election campaign.</p>
---	--

discourses have, of course, permeated a large part of society. But there are people who have resisted, and continue to do so. Government policies push this idea of capitalism, a ferocious capitalism that today has brought us in a situation of poverty, extreme poverty, and chronic child malnutrition.”

Regarding imagination, Norma Sancir explains that “[Indigenous] communities have passed down knowledge from generation to generation, through words and stories. That is why there are many myths, legends, tales, and stories, that are repeated. And many of these are adapted to the context, or to the time.” She argues that “the issue of *how* we imagine is necessary. [...] Our grandmothers and grandfathers fought to keep all that knowledge and pass it on to their grandchildren. It is necessary to foster imagination for change to take place. [...] For indigenous peoples, imagination is part of their narratives.” She goes on to say: “Today, we are in a context where the digital age overwhelms us. It brings us closer, but it surpasses us too, because of the globalized world in which we live, with the media constantly telling us: ‘consume!’. We’re actually taken over by those narratives of consumerism, to buy, thinking ‘you’re a developing community.’ Today [...] there are very few digital media that focus on alternative narratives.”

Co-author Sandra Cakel of the Verapaz Union of Peasant Organizations (UVOC) adds that the Indigenous people of Guatemala do not think “about the development that has been put into our minds, but instead we have that spiritual part, of the energies. For us, it’s all about energies. Medicinal plants, trees, stones, hills. These are all groups of energies that also give us life. So for us it’s so important to maintain that energy, because without energies we don’t have life. That is why it is important to have the Indigenous peoples at the center, because we as an Indigenous people always think about energies, we always think that we are not owners of the Earth or the land, but that we are part of it. We believe that it is from this perspective that we could start to make the

change, and also show the world that we do not think about destruction, but about survival, food, family. In remote communities where paved roads have not arrived, where electricity or the internet has not arrived, nor consumption, consumerism or globalization, or advertising, there, we only see agriculture, we only see fruits, natural medicine. They're not full of the stuff they have in the urban area. From this vision we should promote community development, where the globalized part does not exist. Sometimes we are criticized by those in the urban area, who think we are land thieves. They criticize us when we are demonstrating, when we block roads. But they don't really know in depth why the Indigenous population takes to the streets, or why the peasant population takes to the streets to demand their rights."

#### 4.3. Insights regarding institutional, legal, economic, political power

According to Miriam Suyuk, the DS workshop process—which allowed for dialogue with other smallholder and/or Indigenous communities—reaffirmed the power dynamics they (i.e., the workshop participants, mainly representing smallholder and Indigenous communities) perceive on a day-to-day basis: "It reaffirmed these power dynamics, and also indicates that more and more people are aware that change is necessary. [...] All of us who participated in this workshop know that the more organized we are, the higher the chance of making change happen, and of being heard. I think it is extremely important that we have met colleagues who are already making change happen."

Co-author Norma Sancir of the Maya Ch'orti' Indigenous Council of Olopa says that the DS process has changed her other workshop participants' perspectives. As an example, she mentions "that it was unusual up until this point for an organization like Enverdece, a platform and marketplace for organic producers, to be working with organizations such as the Committee for Peasant Unity (CUC), the Campesino Committee of the Highlands (CCDA) or the UVOC who have had a more political view of the struggle." She adds that the recent change of administration may open up new opportunities: "Today we have a government that is trying to start dialogue and listen to the population, and to the indigenous authorities. This [DS] platform brings together people who have managed, with their actions and work over the years, to disrupt the local powers, and who now have achieved, through everything that preceded the workshop, that today there are governors who represent the people. It's possible [...] to bring about such changes in power."

##### 4.3.1. Does the DS approach foster imagination that challenges existing frameworks and institutions and offers new, alternative ones?

Alternatives imagined by workshop participants included new ways of governance, in which inclusiveness and equity are guaranteed through more democracy. For instance, local assemblies representing communities were imagined to play an increasingly important role in decision-making, safeguarding community autonomy. In addition, legal reform is key for securing vulnerable people's right to land, according to workshop participants. A recurring aspect of this was the idea of land as a common good instead of private property.

Interestingly, the concept of universities based on integration of (western) science and traditional/ancestral knowledge was introduced by participants, inspired by the already established *Pluriversidad Maya Ch'orti'*. Such 'pluriversities' would produce knowledge based on a cosmogonic environmental vision. Participants also imagined the construction of a 'Plurinational' state, in which decentralization and local autonomy are promoted. This represents a discontinuance with the current state "co-opted by elites", which would be replaced by new forms of political leadership centered around active participation of previously marginalized communities.

Strategies imagined for achieving the establishment of such alternative institutions included community organization and policy advocacy (including proposals for fair and equitable laws and fundamental restructuring of the state), awareness and training campaigns, and

strengthening of Indigenous institutions such as Indigenous justice systems. Another proposal was to have politicians aspiring to become president sign agreements to comply with commitments related to environmental and justice related principles.

According to Ubaldino Garcia of the Maya Ch'orti' Indigenous Council of Olopa, a crucial part of the dialogue on transformative change in Guatemala, is for local and/or Indigenous people to tell the stories about the past, present and future in their own words, sharing their own experiences, struggles, and resistance. Spaces for dialogue informed by these local and Indigenous narratives, such as the one facilitated by the DS approach, are crucial for driving change. "Concepts such as 'Buen Vivir' and 'Madre Tierra' (Mother Earth) are fundamental" he argues, and "narrating from one's own language and roots is vital for recognition of their own (ancestral) knowledge, instead of the terms introduced at the country level and by international companies." In addition, he says that stories should be told from the perspectives of the elements of nature as well as those of human beings. He also highlights the importance of language: "One's own native language is crucial to be able to express these ideas, building on ancestral wisdom. A great challenge in this regard is the decline of the Maya Ch'orti' language. Language is a fundamental part of the imagination of the future."

Fredy Canek of Association of Forest Communities of Petén (ACO-FOP) says: "our imagination is the primary means through which our reality is shaped. I consider that everything we are now is because someone, at some point in the past, imagined it and decided to come up with a plan to make it a reality." He argues that powerful actors cultivate a certain way of looking at the future, a particular vision, to make it the most popular: "If everyone imagines the same thing, we're almost certainly going to walk in that direction. Precisely by challenging these narratives, what we could do is that the fewer people occupy this form of imagination, this hegemonic way of imagining the future, and in this case the more we occupy these alternative ways of seeing the future, the easier it is to challenge the dominant narratives." He added that the dominant perspective on traditional, Indigenous forms of agriculture has been negative for a long time: "[...] we revise history, looking into the past to see the bad. But now we are looking into the past to see the good, the good things that we have lost and that we are trying to recover. [...] it's part imagination, and part remembrance. Taking the past and imagining how this past may have been better and bringing that into the future. [...] Alternative narratives can challenge currently dominant ones in the same way that these dominant narratives were established as dominant. The more they get socialized, the more they're communicated, the more the people that will share that same narrative [...]."

On the importance of putting the imagined futures of vulnerable groups front and center, Fredy Canek contends that every individual has their own vision of the future, informed by their perspectives: "The elders allow us to appreciate the remembrance of the past", while the youth "have this vision that it is *their time*." In addition, he says, there are crucial differences between the "reality" of rural communities and people living in the cities, arguing that rural people live "the *real* reality of the country."

Canek goes on to explain that "in a way, [the DS approach] does foster the imagination of alternative futures that challenge current narratives, but better than that, it integrates not only different visions, but origins. This helped us diversify the way we look at things, that helped us shape a common goal with others, and with different visions. A goal that we can share, not only with each other, but one that we can promote together.

Miriam Suyuk adds that "the DS approach definitely allows us to have a more long-term vision, and it allows us to continue strengthening these ideas, that changes are necessary, that it is necessary to continue transforming these realities that we live in today."

##### 4.3.2. Does it foster imagination in which human/political rights, ecosystem rights, plurality and cultural diversity are central?

In addition to the establishment of pluriversities as new higher

education institutions, workshop participants also imagined Guatemala becoming a plurinational state, in which different peoples govern their own territories in sovereignty, inspired by the examples of Bolivia and Ecuador. Recurring themes across the scenarios were the establishment of laws that guarantee community rights and sovereignty, collective ownership of natural resources, and protection of biodiversity. Social unrest and mobilization, as well as successful court cases would eventually lead to an untenable situation for the corrupt and self-serving government, which will be replaced by a democratically elected government that instigates radical changes leading to a legal and justice system at the service of the people, based on respect for nature, human rights, and *buen vivir*.

#### 4.3.3. Does it foster imagination of new modes of production and alternative technologies?

During the workshop, several alternative modes of production and technologies were imagined as part of the DS scenarios. Agroecological principles, as well as new technologies developed at the Pluriversities (introduced above), resulting from integrating traditional/Indigenous knowledge and Western science and technology, are imagined to replace conventional agricultural practices and technology, and eventually contribute to a sustainable and just Guatemalan food system.

Regarding new and/or alternative technologies and modes of production, Miriam Suyuk says that agroecology, currently practiced by communities at the grassroots level, is key as a response to dominant discourses: “This is how dominance is challenged. Through active practice.”

#### 4.4. Insights regarding discourse, narratives, values, worldviews and imaginaries

##### 4.4.1. Does the DS approach foster a reflexive understanding of dominant imaginary? Does it foster an understanding of how society’s assumptions, beliefs, and values limit and distort collective imagination by naturalizing particular worldviews?

The workshop participants called out problematic aspects of the current regime in Guatemala, including concentration of power, state clientelism and privileges of multinational corporations. Moreover, they described ways in which the regime tries to reinforce this status quo, through the use of discursive tools such as the media, through religion, controlling research and (dis)information, and encouraging consumerism.

##### 4.4.2. Does it provoke and transform the dominant imaginary, and overcome the limiting effects of the dominant imaginary?

Participants imagined that through aggressive awareness campaigns, environmental education as well as education based on holistic, ancestral perspectives, and disseminating information using decentralized media, environmental awareness increases, and unsustainable habits change. Smallholder farmers and Indigenous communities become aware again that they possess a significant amount of power, by having access to water, food, and support from the community. Across the scenarios developed by workshop participants, this contributes to the transformation of the dominant imaginary.

Fredy Canek says that while the dominant mantra is “to innovate things and to improve processes, we realize that these innovations are not nearly as efficient as the way it was done before, by our grandparents, great-grandparents and great-great-grandparents. Much of this knowledge is being lost. The Indigenous peoples of Petén are using the means they have in their struggle, in this globalized world. Organization is a key in challenging these imaginaries.”

Norma Sancir says that: “For us, there have been moments in Guatemala that have been very frustrating, very tiring, of political action, of taking to the streets, of demonstrating, of being criminalized. But we were, and still are, standing. That, for me is challenging [the dominant narrative]. Investigations, essays, journalistic notes have been such

an important means to challenge these dominant Western narratives. Also, people making the effort to learn the Ch’orti’ language, passing it on to their kids, helps to challenge the dominant narrative. All those little threads that we are weaving, at the international level, at the municipal level, and also at the local level, contribute to this.”

##### 4.4.3. Does the DS approach interrogate apparent neutrality and potentially resulting exclusion?

Participants interrogated neutrality indirectly, by articulating how the current regime uses discursive tools, state-owned research and (dis) information dissemination, as well as religion to ‘control’ the dominant societal narrative, i.e., the dominant imaginary that is generally taken for granted.

##### 4.4.4. Does the DS approach introduce and/or revitalize new/alternative knowledge (indigenous, local, and/or contesting)?

The participants all imagined ways in which new and ancestral knowledge is introduced or revitalized, gains momentum and eventually becomes commonplace. This includes the establishment of ‘pluriversities’ in which ancestral, Indigenous knowledge and science and technology are integrated, as well as true Indigenous universities. Key in this process is the documentation, systematization, and protection of ancestral knowledge. The transformation toward a more sustainable and just Guatemala also entails the promotion of community (Indigenous) knowledge in resource management and agriculture, and the establishment of a social economy.

##### 4.4.5. Does the DS approach foster the construction of local views of futures?

In the Guatemalan case, the DS approach demonstrated to foster or facilitate the construction of locally based futures. One of the transformative scenarios developed was named “*Ixim Ulew*”, which means “The Land of the Corn” in the Mayan language Kaqchikel, and it tells the story of a ‘green dream’. The story does not follow a common linear timeline, but instead it is based on a clockwise spiral timeline “inspired by the vision of our ancestors who saw the world and life as cycles that expand and evolve.” The scenario is characterized by an agroecological revolution and the formation of a Plurinational State. Another scenario is based on the Mayan calendar, with five periods of four years, each with their own significance, together representing integrality, or “*jun winaq*”. A recurring element in the scenarios is *buen vivir*, an imaginary based on a holistic view of humans and nature, inspired by Indigenous, Andean cosmovisions.

## 5. Discussion

The DS approach was developed to be applicable in a wide range of contexts, from transformation of energy systems to food systems, etcetera, and in diverse geographical contexts. However, projects with Indigenous actors in Guatemala are profoundly different from projects with energy cooperatives in Northwest Europe, for example. Because of this wide applicability, the approach may lack specificity in certain cases, but it allows for adaptability to specific contexts. In its current form, it was developed, tested and validated by European researchers, and applied as such. As a consequence, differences in perception between people from different backgrounds came to the surface. As a notable example, Indigenous and smallholder communities in the Global South are often categorized as being ‘vulnerable groups’ in international agricultural research discourse. This, however, significantly differs from the perspective of smallholder and/or Indigenous communities in Guatemala themselves, as co-author Sandra Calej explains. She contends that the qualification ‘vulnerable’ is only valid in the face of Western agriculture, which “depends on transgenic seeds and on chemical fertilizers” and is forced upon them. In other words, she argues, Indigenous communities are not ‘vulnerable’ in themselves. Norma Sancir adds that “it is from the communities, that the food that reaches the urban areas

where there is no more land to grow [crops]", showing that from their perspective, urban communities with 'Western values' are vulnerable. This prompts the need for a reflexive stance of all actors involved, not least the ones who operate from the dominant, international agricultural research paradigm.

For future use of the DS approach, we therefore strongly encourage to take maximal advantage of its adaptability and involve all key stakeholders in the co-design of a tailored practice fitting the specific context. For this research, we adopted a co-production approach, but still, the design of the methodology was very much rooted in academic tradition. We strongly encourage embracing a participatory action research (PAR) approach to co-production, involving non-academic stakeholders from the start. This would—in addition to participatory workshops, collaborative data analysis and workshops on how to translate transformative pathways into actionable plans—entail collaborative problem framing (Kindon et al., 2007), collectively developing and refining research plans and methodologies, and collectively assessing outcomes, discussing impacts, and identifying further research or action areas (Chevalier and Buckles, 2019). Importantly, this should include the explicit integration of Indigenous methods, such as storytelling or land-based activities into the research design (Datta, 2018) and incorporation of local perspectives, knowledge and imaginaries, as well as adopting terminology reflecting the context, and adapting the methodology to fit local conceptions of time upfront.

Additionally, we should remark that while this paper focuses on power dynamics between regime actors and Seeds, mainly representing smallholder and/or Indigenous communities, it did not reflect on internal power dynamics within these communities. And while all of the Seeds that participated in the process share similar values and perspectives, we cannot completely rule out complexities related to gender, age, social status, and external influences. Gender roles, for instance, are often influenced by both traditional and colonial legacies, and affect women's participation in leadership positions and decision-making (Smith, 2012). Age can also determine authority, with elder members commonly holding respected roles (Postero, 2017). Furthermore, social status within Indigenous communities often correlates with family heritage or spiritual roles, which leads to differences in access to resources and local influence (Dorough and Wiessner, 2020).

We also want to reflect on the pivotal role the CGIAR played in the Green Revolution, primarily through the development and dissemination of high-yield crop varieties, fertilizers, and irrigation techniques aimed at increasing and maximizing agricultural productivity. This approach, though successful in reducing hunger in several regions, led to many of the problems associated with food systems today, i.e., monocultures and dependency on chemical inputs, which significantly contributed to the deterioration of soil health, biodiversity, environmental degradation and social inequities.

In Guatemala specifically, these developments often favored large-scale agriculture over Indigenous and smallholder farmers, sidelining traditional, more sustainable farming methods and deepening inequality regarding land ownership and access to food (Borras and Franco, 2010; Holt-Giménez, 2006). As a consequence, Indigenous communities, particularly in Guatemala's highlands, lost access to land and traditional ways of practicing agriculture. However, in recent decades, the CGIAR has gradually shifted toward sustainable agriculture, agroecology, and climate resilience, increasingly emphasizing social inclusivity and equity, and adaptation to and mitigation of the impacts of climate change. Some programs incorporate local knowledge and support diversified farming systems that are more ecologically balanced and socially just. In addition to the Disruptive Seeds project reported on in this paper, other such initiatives have been initiated. In Guatemala, initiatives like participatory plant breeding and sustainable watershed management reflect these changes, and are adapted to Indigenous practices and local needs (Anderson et al., 2019; Mier y Terán Giménez Cacho et al., 2018).

## 6. Conclusion

This paper reports on the first time the DS approach was applied as a practice for envisioning transformative change. It shows great value in the context of Indigenous communities, being compatible with their imaginaries and perspectives, as the Guatemalan co-authors of this paper contend. It demonstrates huge potential in imagining transformative change that emphasizes issues of social justice and equity, and challenge dominant political structures as well as worldviews and imaginaries. The approach helped to articulate and interrogate current political and economic power relations, and, importantly, also the underlying dominant discourse and imaginaries, thereby claiming space for revitalizing and building on ancestral Indigenous knowledge. As a bottom-up approach, it starts from currently marginal but potentially impactful initiatives that often originate in communities that are relatively powerless. As such, it potentially contributes to empowerment of marginalized communities.

Imagination is a crucial and integral component of Indigenous peoples' resistance against the negative impacts of colonialism and capitalism, according to the Guatemalan co-authors of this paper. It is an intrinsic part of their narrative, and it provides the basis for change to materialize. The DS approach helped to make explicit the power dynamics Indigenous people are experiencing on a daily basis, and it provided a platform for them to voice their perspectives, experiences, struggles and concerns in their own words, which is key for instigating change. Moreover, it brought together actors with shared objectives but from different communities and with different frames, ranging from organic market initiatives to Indigenous political activists, and it facilitated the formation of actor coalitions for transformative change. Interesting commonalities between the different thematic transformative pathways developed during the DS workshop include a circular notion of time and holistic view of man and nature, inspired by Mayan ancestral knowledge as well as contemporary worldviews that build on Indigenous American cosmovisions, such as *Buen Vivir*.

More generally, the findings in this paper highlight the potential of collective imagination for generating alternatives to current, unsustainable and unjust realities. It shows the value that lies in incorporating the knowledge, perspectives, values and imaginaries of—often marginalized—communities into conversations about sustainability transformations. Approaches that center on bottom-up initiatives based on sources of knowledge that pose alternatives to dominant discourses, such as the DS approach, show potential for substantial contributions to current debates around how to navigate the challenges of the Anthropocene.

## Declaration of competing interest

The authors of this manuscript declare that no conflicts of interest exist.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.crsust.2024.100270>. <https://doi.org/10.1016/j.crsust.2024.100270>.

## Data availability

Data is available online: <https://cgspace.cgiar.org/items/f136e0a6-fe0c-46cd-be6c-d2ef285da16e>

## References

- Albó, X., 2004. Ethnic identity and politics in the central Andes: the cases of Bolivia, Ecuador, and Peru. In: Burt, J.-M., Mauceri, P. (Eds.), *Politics in the Andes: Identity, Conflict, Reform*. University of Pittsburgh Press, Pittsburgh, PA, USA.

- Alonso-Fradejas, A., 2012. Land control-Grabbing in Guatemala: The political economy of contemporary agrarian change. *Can. J. Dev. Stud.* 33 (4), 509–528.
- Alonso-Fradejas, A., 2015. Anything but a story foretold: multiple politics of resistance to the agrarian extractivist project in Guatemala. *J. Peasant Stud.* 42 (3–4), 489–515. <https://doi.org/10.1080/03066150.2015.1013468>.
- Anderson, R., 2016. Afrofuturism 2.0 & the black speculative arts movement: notes on a manifesto. *Obsidian* 42 (1/2), 228–236.
- Anderson, C.R., Bruil, J., Chappell, M.J., Kiss, C., Pimbert, M.P., 2019. From transition to domains of transformation: getting to sustainable and just food systems through agroecological principles. *Sustainability* 11 (19), 5272.
- Anderson, C.R., Pimbert, M.P., Chappell, M.J., Brem-Wilson, J., Claeys, P., Kiss, C., Maughan, C., Milgroom, J., McAllister, G., Moeller, N., Singh, J., 2020. Agroecology now - connecting the dots to enable agroecology transformations. *Agroecol. Sustain. Food Syst.* 44 (5), 561–565.
- Avelino, F., 2017. Power in sustainability transitions: analysing power and (dis)empowerment in transformative change towards sustainability. *Environ. Policy Gov.* 520 (August), 505–520. <https://doi.org/10.1002/eet.1777>.
- Avelino, F., Rotmans, J., 2009. Power in transition: an interdisciplinary framework to study power in relation to structural change. *Eur. J. Soc. Theory* 12 (4), 543–569. <https://doi.org/10.1177/1368431009349830>.
- Barendregt, L., Bendor, R., van Eekelen, B.F., 2024. Public participation in future: a systematic literature review. *Futures* 158. <https://doi.org/10.1016/j.futures.2024.103346>.
- Bastiaansen, J., Huybrechts, F., Merlet, P., Romero, M., Van Hecken, G., 2021. Fostering bottom-up actor coalitions for transforming complex rural territorial pathways. *Curr. Opin. Environ. Sustain.* 49, 42–49. <https://doi.org/10.1016/j.cosust.2021.02.001>.
- Beling, A.E., Vanhulst, J., Demaria, F., Rabi, V., Carballo, A.E., 2018. Discursive synergies for a 'great transformation' towards sustainability: pragmatic contributions to a necessary dialogue between human development, degrowth, and buen vivir. *Ecol. Econ.* 144, 304–313.
- Bellamy, R., Lezaun, J., 2017. Crafting a public for geoengineering. *Public Underst. Sci.* 26 (4), 402–417. <https://doi.org/10.1177/0963662515600965>.
- Bennett, E.M., Solan, M., Biggs, R., McPhearson, T., Norström, A.V., Olsson, P., Pereira, L., Peterson, G.D., Raudsepp-Hearne, C., Biermann, F., Carpenter, S.R., Ellis, E.C., Hichert, T., Galaz, V., Lahsen, M., Milkoreit, M., Martín-López, B., Nicholas, K.A., Preiser, R., et al., 2016. Bright spots : seeds of a good Anthropocene. *Front. Ecol. Environ.* 14 (8), 441–448. <https://doi.org/10.1002/fee.1309>.
- Berkes, F., 2012. *Sacred Ecology*. Routledge.
- Borras, S.M., Franco, J.C., 2010. Towards a broader view of the politics of global land grab: rethinking land issues, reframing resistance. In: *Initiatives in Critical Agrarian Studies Working Paper Series*, 1.
- Bourdieu, P., 1991. *Language and Symbolic Power*. Harvard University Press.
- Brisbois, M.C., 2019. Powershifts: a framework for assessing the growing impact of decentralized ownership of energy transitions on political decision-making. *Energy Res. Soc. Sci.* 50 (December 2018), 151–161. <https://doi.org/10.1016/j.erss.2018.12.003>.
- Burch, S., Gupta, A., Inoue, C.Y.A., Kalfagianni, A., Persson, Å., Gerlak, A.K., Ishii, A., Patterson, J., Pickering, J., Scobie, M., Van Der Heijden, J., Vervoort, J., Adler, C., Bloom, M., Djalante, R., Dryzek, J., Galaz, V., Jinnah, S., Kim, R.E., Gordon, C., Olsson, L., Van Leeuwen, J., Ramasar, V., Wapner, P., Zondervan, R., 2019. New directions in earth system governance research. *Earth Syst. Govern.* 1.
- Castoriadis, C., 1975. *The Imaginary Institution of Society*. Polity Press, Cambridge, UK.
- Chambers, J.M., Wyborn, C., Ryan, M.E., Reid, R.S., Riechers, M., Serban, A., et al., 2021. Co-productive agility and four collaborative pathways to sustainability transformations. *Glob. Environ. Chang.* 72, 102422. <https://doi.org/10.1016/j.gloenvcha.2021.102422>.
- Chevalier, J.M., Buckles, D.J., 2019. *Participatory Action Research: Theory and Methods for Engaged Inquiry*. Routledge.
- Clement, F., 2010. Analysing decentralised natural resource governance: proposition for a "politicised" institutional analysis and development framework. *Policy. Sci.* 43, 129–156.
- ClimBeR, 2022. Initiative Overview – ClimBeR: Building Systemic Resilience Against Climate Variability and Extremes. <https://www.cgair.org/research/publication/initiative-overview-climber-building-systemic-resilience-against-climate-variability-and-extremes/>.
- Copeland, N., 2019. Linking the defence of territory to food sovereignty: Peasant environmentalisms and extractive neoliberalism in Guatemala. *J. Agrar. Change* 19 (1), 21–40.
- Datta, R., 2018. Decolonizing both researcher and research and its effectiveness in Indigenous research. *Res. Ethics* 14 (2), 1–24.
- David-Chavez, D.M., Gavin, M.C., 2018. A global assessment of Indigenous community engagement in climate research. *Environ. Res. Lett.* 13 (12), 123005.
- Davidson, D.J., 2010. The applicability of the concept of resilience to social systems : some sources of optimism and nagging doubts. *Soc. Nat. Resour.* 1135–1149.
- Davoudi, S., 2012. Resilience: A bridging concept or a dead end? *Plan. Theory Pract.* 13 (2), 299–333. <https://doi.org/10.1080/14649357.2012.677124>.
- Dewulf, A.R.T., Craps, M., Dercon, G., 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. *J. Community Appl. Soc. Psychol.* 192, 177–192.
- Dey, P., Mason, C., 2018. Overcoming constraints of collective imagination: An inquiry into activist entrepreneurship, disruptive truth-telling and the creation of 'possible worlds'. *J. Bus. Ventur.* 33 (1), 84–99. <https://doi.org/10.1016/j.jbusvent.2017.11.002>.
- Dilling, L., Daly, M.E., Travis, W.R., Ray, A.J., Wilhelm, O.V., 2023. The role of adaptive capacity in incremental and transformative adaptation in three large U.S. Urban water systems. *Glob. Environ. Change* 79, 102649. <https://doi.org/10.1016/j.gloenvcha.2023.102649>.
- Dorough, D.S., Wiessner, S., 2020. Indigenous peoples and cultural heritage. In: Francioni, F., Vrdoljak, A.F. (Eds.), *The Oxford Handbook of International Cultural Heritage Law*. Oxford Handbooks, Oxford, UK. <https://doi.org/10.1093/law/9780198859871.003.0018>.
- Dowd, A.M., Marshall, N., Fleming, A., Jakku, E., Gaillard, E., Howden, M., 2014. The role of networks in transforming Australian agriculture. *Nat. Clim. Chang.* 4 (7), 558–563. <https://doi.org/10.1038/nclimate2275>.
- Duncan, J., Levkoe, C.Z., Moragues-Faus, A., 2019. Envisioning new horizons for the political economy of sustainable food systems. *IDS Bulletin* 50 (2), 37–56. <https://doi.org/10.19088/1968-2019.117>.
- Escobar, A., 1995. *Encountering Development: The Making and Unmaking of the Third World*. Princeton University Press.
- Escobar, A., 2008. *Territories of Difference: Place, Movements, Life, Redes*. Duke University Press.
- Escobar, A., 2018. *Designs for the Pluriverse*. Duke University Press, Durham, NC, USA.
- Feldman, S., Biggs, S., 2012. The politics of international assessments: the IAASTD process, reception, and significance. *J. Agrar. Change* 12 (1), 144–169. <https://doi.org/10.1111/j.1471-0366.2011.00333.x>.
- Feola, G., 2015. Societal transformation in response to global environmental change: a review of emerging concepts. *AMBIO* 376–390.
- Feola, G., 2019. Degrowth and the unmaking of capitalism: beyond 'decolonization of the imaginary'. *Acme* 18, 977–997.
- Feola, G., Koretskaya, O., Moore, D., 2021. (Un)making in sustainability transformation beyond capitalism. *Glob. Environ. Chang.* 69.
- Fisher, E., Brondizio, E., Boyd, E., 2022. Critical social science perspectives on transformations to sustainability. *Curr. Opin. Environ. Sustain.* 55. <https://doi.org/10.1016/j.cosust.2022.101160>.
- Galafassi, D., Ta'bara, J.D., Heras, M., Iles, A., Locke, K.A., Milkoreit, M., 2018. Restoring our senses, restoring the Earth. Fostering imaginative capacities through the arts for envisioning climate transformations. *Elementa: Sci. Anthropol.* 6, 69. <https://doi.org/10.1525/elementa.330>.
- Gatti, D., 2020. *La ira en las entrañas del odio*. Brecha. Retrieved 13 June 2024.
- Gaventa, J., 2006. Finding the Spaces for Change: A Power Analysis. *IDS Bulletin* 37, 23–33. <https://doi.org/10.1111/j.1759-5436.2006.tb00320.x>.
- Hale, C.R., 2002. Does multiculturalism menace? Governance, cultural rights, and the politics of identity in Guatemala. *J. Lat. Am. Stud.* 34 (3), 485–524.
- Hawlina, H., Clifford Pedersen, O., Zittoun, T., 2020. Imagination and social movements. *Curr. Opin. Psychol.* 35, 31–35. <https://doi.org/10.1016/j.copsy.2020.02.009>.
- Helfgott, A., 2018. Operationalising systemic resilience. *Eur. J. Oper. Res.* 268 (3), 852–864. <https://doi.org/10.1016/j.ejor.2017.11.056>.
- Holt-Giménez, E., 2006. *Campesino a Campesino: Voices from Latin America's Farmer to Farmer Movement for Sustainable Agriculture*. Food First Books.
- Hornborg, A., 2009. Zero-sum world: challenges in conceptualizing environmental load displacement and ecologically unequal exchange in the world-system. *Int. J. Comp. Sociol.* 50, 237–262.
- Inayatullah, S., 2002. Reductionism or layered complexity ? The futures of futures studies. *Futures* 34, 295–302.
- Jasanoff, S., 2004. *States of Knowledge: The co-Production of Science and Social Order*. Routledge.
- Jasanoff, S., Kim, S.H., 2009. Containing the atom: sociotechnical imaginaries and nuclear power in the United States and South Korea. *Minerva* 47, 119–146.
- Jasanoff, S., Kim, S.H., 2015. *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*. University of Chicago Press.
- Kates, R.W., Travis, W.R., Wilbanks, T.J., 2012. Transformational adaptation when incremental adaptations to climate change are insufficient. *Proc. Natl. Acad. Sci.* 109, 7156–7161.
- Kindon, S., Pain, R., Kesby, M., 2007. *Participatory Action Research Approaches and Methods: Connecting People, Participation and Place*. Routledge.
- Laidler, G.J., 2006. Inuit and scientific perspectives on the relationship between sea ice and climate change: the ideal complement? *Clim. Chang.* 78 (2–4), 407–444.
- Leach, M., Scoones, I., Stirling, A., 2010. *Dynamic Sustainabilities: Technology, Environment, Social Justice*. Routledge, Milton Park, UK.
- Louis, R.P., 2007. Can you hear us now? Voices from the margins: using Indigenous methodologies in geographic research. *Geogr. Res.* 45 (2), 130–139. <https://doi.org/10.1111/j.1745-5871.2007.00443.x>.
- Louis, M., Maertens, L., 2021. *Why International Organizations Hate Politics: Depoliticizing the World*. Routledge.
- Lucero, J.A., 2008. *Struggles of Voice: The Politics of Indigenous Representation in the Andes*. University of Pittsburgh Press.
- Meadowcroft, J., 2009. What about the politics? Sustainable development, transition management, and long term energy transitions. *Policy. Sci.* 323–340.
- Midgley, G., 2000. *Systemic Intervention: Philosophy, Methodology and Practice*. Kluwer Academic, New York, USA.
- Mier y Terán Giménez Cacho, M., Giraldo, O.F., Rosset, P., Aldasoro, M., Morales, H., Ferguson, B.G., et al., 2018. Bringing agroecology to scale: key drivers and emblematic cases. *Agroecol. Sustain. Food Syst.* 42 (6), 637–665.
- Milkoreit, M., 2017. Imaginary politics: climate change and making the future. *Elementa: Sci. Anthropol.* 5, 1–18.
- Miller, C.A., Wyborn, C., 2020. Co-production in global sustainability: histories and theories. *Environ. Sci. Pol.* 113, 88–95. <https://doi.org/10.1016/j.envsci.2018.01.016>.
- Mitchell, A., Chaudhury, A., 2020. Worlding beyond 'the' 'end' of 'the world': white apocalyptic visions and BIPOC futurisms. *Int. Rel.* 34 (3), 309–332. <https://doi.org/10.1177/004717820948936>.

- Moore, M.-L., Milkoreit, M., 2020. Imagination and transformations to sustainable and just futures. *Elementa: Sci. Anthropol.* 8, 1. <https://doi.org/10.1525/elementa.2020.081>.
- Nadasdy, P., 2007. Adaptive co-management and the gospel of resilience. In: Armitage, D., Berkes, F., Doubleday, N. (Eds.), *Adaptive co-Management: Collaboration, Learning, and Multi-Level Governance*. UBC Press, Vancouver, pp. 208–227.
- Navarro, M., 1999. Guatemalan Army Waged 'Genocide,' New Report Finds. *The New York Times*. Retrieved on 17 October 2024. <https://www.nytimes.com/1999/02/26/world/guatemalan-army-waged-genocide-new-report-finds.html>.
- Olsson, P., Galaz, V., Boonstra, W.J., 2014. Sustainability transformations: a resilience perspective. *Ecol. Soc.* 19 (4). <https://doi.org/10.5751/ES-06799-190401>.
- Pansardi, P., 2012. Power to and power over : two distinct concepts of power ? *J. Political Power* 5.
- Park, S.E., Marshall, N.A., Jakku, E., Dowd, A.M., Howden, S.M., Mendham, E., Fleming, A., 2012. Informing adaptation responses to climate change through theories of transformation. *Glob. Environ. Chang.* 22 (1), 115–126. <https://doi.org/10.1016/j.gloenvcha.2011.10.003>.
- Parsons, T., 1967. *On the Concept of Political Power: Sociological Theory and Modern Society*. Free Press, London, UK.
- Patel, R., 2013. The long green revolution. *J. Peasant Stud.* 40 (1), 1–63. <https://doi.org/10.1080/03066150.2012.719224>.
- Patterson, J., Schulz, K., Vervoort, J., Van Der Hel, S., Widerberg, O., Adler, C., Hurlbert, M., Anderton, K., Sethi, M., Barau, A., 2017. Exploring the governance and politics of transformations towards sustainability. *Environ. Innov. Soc. Trans.* 24, 1–16.
- Pigott, A., 2018. Imagining socioecological transformation: an analysis of the Welsh Government's policy innovations and orientations to the future. *Elementa: Sci. Anthropol.* 6, 60. <https://doi.org/10.1525/elementa.315>.
- Piketay, T., Saez, E., 2014. Inequality in the long run. *Science* 344 (6186), 838–843.
- Postero, N., 2017. *The Indigenous State: Race, Politics, and Performance in Plurinational Bolivia*. University of California Press.
- Raudsepp-Hearne, C., Peterson, G., Bennett, E., Biggs, R., Norström, A., Pereira, L., Vervoort, J., Iwaniec, D., McPhearson, T., Olsson, P., Hichert, T., Falardeau, M., Jiménez Aceituno, A., 2019. Seeds of good anthropocenes : developing sustainability scenarios for Northern Europe. *Sustain. Sci.* 15, 605–617.
- Rice, A.M., Einbinder, N., Calderón, C.I., 2023. With agroecology, we can defend ourselves : examining campesino resilience and economic solidarity during pandemic-era economic shock in Guatemala. *Agroecol. Sustain. Food Syst.* 47 (2), 273–305. <https://doi.org/10.1080/21683565.2022.2140378>.
- Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F.S., Lambin, E., Lenton, T.M., Scheffer, M., Folke, C., Schellnhuber, H.J., Nykvist, B., de Wit, C.A., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P.K., Costanza, R., Svedin, U., et al., 2009. A safe operating space for humanity. *Nature* 461 (7262), 472–475. <https://doi.org/10.5751/ES-03180-140232>.
- Rodriguez, I., Walter, M., Temper, L. (Eds.), 2024. *Just Transformations: Grassroots Struggles for Alternative Futures*. Pluto Press, London, UK.
- Rutting, L., Vervoort, J.M., Mees, H., Driessen, P.P.J., 2021. Participatory scenario planning and framing of social-ecological systems : an analysis of policy formulation processes in Rwanda and Tanzania. *Ecol. Soc.* 26.
- Rutting, L., Vervoort, J., Mees, H., Pereira, L., Veeger, M., Muiderman, K., Mangnus, A., Winkler, K., Olsson, P., Hichert, T., Lane, R., Bottega Pergher, B., Christiaens, L., Bansal, N., Hendriks, A., Driessen, P., 2023. Disruptive seeds: a scenario approach to explore power shifts in sustainability transformations. *Sustain. Sci.* 18, 1117–1133. <https://doi.org/10.1007/s11625-022-01251-7>.
- Rutting, L.J., Vervoort, H., Mees, Driessen, P., 2024. Breaking out of conventions: how scenario planners can increase their reflexivity regarding societal imaginaries. *Futures* 160, 103395. ISSN 0016-3287. <https://doi.org/10.1016/j.futures.2024.103395>.
- Satterthwaite, E.V., McQuain, L., Almada, A.A., Rudnick, J.M., Eberhardt, A.L., Doerr, A.N., O'Connor, R.J., Wright, N., Briggs, R.A., Robbins, M.J., Bastidas, C., Sparks, E.L., Goodrich, K.A., Costello, W.J., 2024. Centering knowledge co-production in sustainability science: why, how, and when. *Oceanography* 37 (1), 26–37.
- Schlosberg, D., Carruthers, D., 2010. Indigenous struggles, environmental justice, and community capabilities. *Glob. Environ. Polit.* 10 (4), 12–35. [https://doi.org/10.1162/GLEP\\_a.00029](https://doi.org/10.1162/GLEP_a.00029).
- Scoones, I., Leach, M., Newell, P. (Eds.), 2015. *The Politics of Green Transformations*, 1st ed. Routledge <https://doi.org/10.4324/9781315747378>.
- Sharpe, B., Hodgson, A., Leicester, G., Lyon, A., Fazey, I., 2016. Three horizons: a pathways practice for transformation. *Ecol. Soc.* 21, 2.
- Simonds, V.W., Christopher, S., 2013. Adapting Western research methods to Indigenous ways of knowing. *Am. J. Public Health* 103 (12), 2185–2192. <https://doi.org/10.2105/AJPH.2012.301157>.
- Smith, L.T., 2012. *Decolonizing Methodologies: Research and Indigenous Peoples*. Otago University Press, Dunedin, New Zealand.
- Smith, A., Stirling, A., 2010. The politics of social-ecological resilience and sustainable socio-technical transitions. *Ecol. Soc.* 15, 11.
- Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O., Ludwig, C., 2015. The trajectory of the anthropocene: the great acceleration. *Anthropoc. Rev.* 2 (1), 81–98. <https://doi.org/10.1177/2053019614564785>.
- Stirling, A., 2015. Emancipating transformations - from controlling 'the transition' to culturing plural radical progress. In: Scoones, I., Leach, M., Newell, P. (Eds.), *The Politics of Green Transformations*. Routledge, London, pp. 54–67.
- Stoetzel, M., Yuval-Davis, N., 2002. Standpoint theory, situated knowledge and the situated imagination. *Fem. Theory* 3 (3), 315–333. <https://doi.org/10.1177/146470002762492024>.
- Streeby, S., 2018. *Imagining the Future of Climate Change: World-Making through Science Fiction and Activism*. University of California Press, Berkeley, USA.
- Swartz, D., 2013. *Symbolic Power, Politics, and Intellectuals: The Political Sociology of Pierre Bourdieu*. University of Chicago Press.
- Taylor, C., 2002. *Modern Social Imaginaries*. <http://read.dukeupress.edu/public-culture/article-pdf/14/1/91/453152/PC141-04Taylor.pdf>.
- Terry, N., Castro, A., Chibwe, B., Karuri-Sebina, G., Savu, C., Pereira, L., 2024. Inviting a decolonial praxis for future imaginaries of nature: introducing the entangled time tree. *Environ. Sci. Pol.* 151. <https://doi.org/10.1016/j.envsci.2023.103615>.
- van Rijnsoever, F.J., Leendertse, J., 2020. A practical tool for analyzing socio-technical transitions. *Environ. Innov. Soc. Trans.* 37, 225–237.
- Veeger, M., Rutting, L., von Breyman, R., 2023. Semillas Disruptivas para imaginar un Sistema Alimentario Justo y Sostenible en Guatemala. Informe de Taller. Iniciativa CGIAR sobre Resiliencia Climática, ClimBeR. Julio de 2023, Panajachel, Guatemala.
- Vervoort, J., Gupta, A., 2018. Anticipating climate futures in a 1.5 °C era: the link between foresight and governance. *Curr. Opin. Environ. Sustain.* 31 (January), 104–111. <https://doi.org/10.1016/j.cosust.2018.01.004>.
- Vervoort, J.M., Bendor, R., Kelliher, A., Strik, O., Helfgott, A.E.R., 2015. Scenarios and the art of worldmaking. *Futures* 74, 62–70. <https://doi.org/10.1016/j.futures.2015.08.009>.
- Vervoort, J.M., Smeenk, T., Zamuruieva, I., Reichelt, L.L., van Veldhoven, M., Rutting, L., Light, A., Houston, L., Wolstenholme, R., Dolejšová, M., Jain, A., Ardern, J., Catlow, R., Vaajakallio, K., Falay von Flitner, Z., Putrlje-Srdić, J., Lohmann, J.C., Moosdorff, C., Mattelmäki, T., Ampatzidou, C., Choi, J.H.-J., Botero, A., Thompson, K.A., Torrens, J., Lane, R., Mangnus, A.C., 2024. 9 Dimensions for evaluating how art and creative practice stimulate societal transformations. *Ecol. Soc.* 29 (1), 29. <https://doi.org/10.5751/ES-14739-290129>.
- Voß, J.-P., Bornemann, B., 2011. The politics of reflexive governance: challenges for designing adaptive management and transition management. *Ecol. Soc.* 16.
- Westley, F., Olsson, P., Folke, C., Homer-dixon, T., Vredenburg, H., Looibach, D., Thompson, J., Lambin, E., Sendzimir, J., Banerjee, B., Galaz, V., van der Leeuw, S., 2011. Tipping toward sustainability: emerging pathways of transformation. *Ambio* May, 762–780. <https://doi.org/10.1007/s13280-011-0186-9>.
- Whyte, K.P., 2013. On the role of traditional ecological knowledge as a collaborative concept: a philosophical study. *Ecol. Process.* 2 (1), 1–12.
- Whyte, K.P., 2017. Indigenous climate change studies: indigenizing futures, decolonizing the Anthropocene. *English Language Notes* 55 (1–2), 153–162. <https://doi.org/10.1215/00138282-55.1-2.153>.
- Whyte, K., 2018. Indigenous science (fiction) for the anthropocene: ancestral dystopias and fantasies of climate change crises. *Environ. Plann. E: Nat. Space* 1 (1–2), 224–242. <https://doi.org/10.1177/2514848618777621>.
- Wiebe, K., Zurek, M., Lord, S., Brzezina, N., Gabrielyan, G., Libertini, J., Westhoek, H., 2018. Scenario development and foresight analysis: exploring options to inform choices. *Annu. Rev. Environ. Resour.* 43, 545–570.
- Wilson, S., 2008. *Research Is Ceremony: Indigenous Research Methods*. Fernwood Publishing.
- Wittmayer, J.M., Campos, I., Avelino, F., Brown, D., Doracić, B., Fraaije, M., Gahr, S., Hinsch, A., Assalini, S., Becker, T., Marín-Gonzalez, E., Holstenkamp, L., Bedoić, R., Duić, N., Oxenaar, S., Puksec, T., 2022. Thinking, doing, organising: prefiguring just and sustainable energy systems via collective prosumer ecosystems in Europe. *Energy Res. Soc. Sci.* 86, 102425. <https://doi.org/10.1016/j.erss.2021.102425>.
- World Bank, 2024. Guatemala: Overview. <https://www.worldbank.org/en/country/guatemala/overview#1>.
- Ybarra, M., 2011. Privatizing the Tzuultaq'a? Private property and spiritual reproduction in post-war Guatemala. *Peasant Stud.* 38 (4), 793–810. <https://doi.org/10.1080/03066150.2011.607702>.