

## “I’m Fixing a Hole Where the Rain Gets in, and Stops My Mind from Wandering”: Approaching Sustainable Climate Change Adaptations

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(Manuscript received 21 October 2022, in final form 26 February 2023, accepted 27 February 2023)

**ABSTRACT:** Sustainable development is a challenging field of research, colored by the paradoxes of modernity and development, and the trade-offs involved in balancing the “sustainable” and “development” sides of the various sustainable development goals. We must take these overarching challenges into account when entering a more specific discussion of what a concept of sustainable climate change adaptation may entail. This article reviews the history of this concept, including insights provided by the recent publications composing a special collection of *Weather, Climate, and Society* on the topic of sustainable climate change adaptation. This collection reflects on why and how the term sustainable development should be included in our understandings of and efforts toward climate change adaptation and proposes a preliminary framework for distinguishing between conventional and sustainable adaptation.

**SIGNIFICANCE STATEMENT:** This article reviews the history of the term “sustainable climate change adaptation” and reflects on the relationship between sustainable development and climate change adaptation efforts. It ends by proposing a framework for distinguishing between conventional and sustainable adaptation.

**KEYWORDS:** Social science; Adaptation; Community; Decision-making

### 1. Introduction

In 2019, the Norwegian government introduced an annual basic funding of a virtual research center—the Norwegian Research Centre on Sustainable Climate Change Adaptation (Noradapt)—tasked with producing knowledge on how to adapt to the impacts of climate change in ways that are not in conflict with, and preferably are supportive of, the implementation of other sustainability goals and that help move society toward enhanced sustainability. One of the first efforts of Noradapt has been to summarize the state of knowledge on the concept and practice of sustainable climate change adaptation, to outline the possible difference between “conventional” and “sustainable” climate change adaptation, and to investigate the implications of such differences for climate change adaptation policymaking, an effort that is documented in the special collection of *Weather, Climate, and Society* (WCAS) on sustainable climate change adaptation. This article is the overview description for the special collection.

The conventional way in which climate change adaptation is understood and practiced within both research and governance has a high risk of generating misalignment with other sustainable development goals (SDGs), thus leading to “unsustainable” outcomes. The reason for this is three pronged

and linked to the concepts of transformation, maladaptation, and malmitigation.

*First*, in many countries, climate change adaptation arose within the context of civil protection. The responsible institutions have therefore tended to be those involved in national and civil security, as opposed to those involved in environmental issues (Groven et al. 2012). This has, among other aspects, led to an engineering-based understanding of adaptation as a process of “bouncing back,” in the sense of returning to “normal” and minimizing the changes to the system, rather than “bouncing forward,” which represents a more “transformative” approach, in which an adaptation leads to a fundamental change to the system (Davoudi et al. 2013). This resistance to change, and a preoccupation with minimizing negative impact rather than maximizing positive impact, contrasts with change strategies developed within environmental institutions, which place greater emphasis on the possibilities for maximizing positive impact (Groven et al. 2012).

*Second*, as described in the latest assessment report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) on impacts, adaptation, and vulnerability, the need for rapid implementation of drastic adaptation measures will increase in the coming years (IPCC 2022). If seen as only relating to climate change impacts, it is fair to assume that the continued introduction of new and more radical adaptation measures may increase the likelihood of causing conflicts with other sustainability goals, not least the goal of mitigating climate change. This challenge is captured in the growing literature on *maladaptation* (e.g., Juhola et al. 2016).

*Third*, a related challenge to the one above concerns mitigation and the danger of what is being termed “malmitigation”

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DOI: 10.1175/WCAS-D-22-0113.1

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(IPCC 2022). Malmitigation refers in this context to a process in which a drastic increase in mitigation efforts (e.g., driven by national green transition strategies) may lead to conflicts with adaptation concerns by increasing climate change vulnerabilities (Aall et al. 2016). While the literature on maladaptation has grown considerably in the last years, the notion of malmitigation has yet to receive serious attention within research and policy.

The dangers of both maladaptation and malmitigation present a growing need to develop an integrated approach to adaptation and mitigation and to situate such work within the context of the SDGs. The notion of sustainable adaptation has the potential to frame such an approach.

The research question of this overview, as well as for the special collection as a whole, is: what differentiates “sustainable” from “conventional” climate change adaptation? In addressing this question, we start by briefly summarizing the research discourse relating to the three concepts of societal transformation, maladaptation, and malmitigation. We then present a review of previous research on the concept of sustainable climate change adaptation, followed by a summary of the papers that make up this special collection on sustainable climate change adaptation. Last, we conclude the paper by presenting a preliminary framework for differentiating between “conventional” and “sustainable” climate change adaptation.

## 2. State of the art: Societal transformation, maladaptation, and malmitigation in climate change research

### a. To transform or become transformed

Transformation has become a core concept in both the sustainability and the climate change debate (Fazey et al. 2017). There are at least 50 different definitions of the concept, applied within many different contexts ranging from mathematics, chemistry, and medicine, to the humanities and social sciences (Aall and Skarbø 2014).

Most humanities and social science research that applies the concept refers to transformations as shifts that fundamentally alter human and environmental relations and interactions within a system, to the extent that the purpose and function of the system is altered (Olsson et al. 2014; O’Brien 2012). The added qualifier *sustainability* transformations add an important normative dimension in which the transformative processes lead to enhanced well-being and integrity within human–environment systems (Salomaa and Juhola 2020). This is understood as standing in contrast to transitions, which imply gradual changes to existing systems that may or may not lead to more fundamental change (Hölscher et al. 2018).

The origin of the United Nations–sponsored program on sustainable development, the so-called Brundtland Report from 1987, states that the idea of a sustainable development “involves a progressive transformation of economy and society” (World Commission on Environment and Development 1987, p. 37). While the notion of transformation has been part of the debates surrounding sustainability for several decades, there has been a significant increase in studies and policy

documents that refer to the need for transformations or transformative change. In recent years, emphasis has been put on what characterizes transformative processes and how, if at all, they can be managed for a desired result. This emphasis is exemplified in a recent review of the state of knowledge on sustainable development, which concludes that

the imperatives of environmental sustainability, poverty alleviation and social justice [. . .] call for ambitious societal transformations. As such, few aspects of actionable knowledge for sustainability are more crucial than those concerning the processes of transformation (Scoones et al. 2020, p. 42).

Simultaneously, however, there is an awareness of the contextual nature of what can be defined as a transformation within social–ecological systems. While certain general characteristics can be identified for a transformative process and outcome, exactly what it looks and feels like will, as with sustainability, be context specific. Recognizing this contextuality, Amundsen and Hermansen (2021) suggest that transformation be viewed as a boundary object that is used with a high degree of flexibility, and that it therefore should be conceived of in the plural, *transformations*.

The word transformation had been sparsely mentioned in the main IPCC assessment reports up to the fifth report published in 2014, in which the number of hits increased by a factor of 15. This number again doubled from the Fifth to the Sixth Assessment Report in 2021/22. The meaning of the concept also changed notably during this period, from mainly being used as an adjective to describe the extent of impacts of climate change to becoming a much broader concept describing the ways in which society needs to respond to climate change.

This wider and far more prescriptive meaning of the concept of transformation first gained traction in the part of the IPCC discourse that dealt with adaptation. This understanding of transformation was first outlined in the 2012 IPCC special report, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*, outlining the difference between the current approach to adaptation and what was envisioned as a new and transformative approach to adaptation: “Some strategies for effectively managing risks and adapting to climate change involve adjustments to current activities. Others require transformation or fundamental change” (IPCC 2012, p. 1). The report defines transformation as “the altering of fundamental attributes of a system (including value systems; regulatory, legislative, or bureaucratic regimes; financial institutions; and technological or biological systems)” (IPCC 2012, p. 4).

Alongside the question of what characterizes transformations (Scoones et al. 2020) is an equally pressing question of how, and if, such processes can be managed deliberately to ensure a desired, and sustainable, outcome. While uncertain and messy, the alternative to deliberate transformation will likely be an undeliberate process of *becoming transformed* due to inadvertently crossing thresholds that result from insufficient system resilience (Nelson et al. 2007). As with other dramatic and unintentional shifts in socioeconomic and ecological systems, the impact of becoming transformed is likely to fall alongside the usual fault lines of inequality, which will

further exacerbate current unsustainable trajectories (Eriksen et al. 2021). Empirical research indicates that the transformative potentials of adaptation projects often get undermined by decision-makers prioritizing “incremental adaptation that protects and preserves existing systems and behaviors, over transformative adaptation that will disrupt them or require their abandonment or displacement” (Eriksen et al. 2021, p. 5). Thus, defining and distinguishing sustainable adaptation from “adaptation as usual” will be crucial for meeting the climate change challenge in ways that are effective, equitable, and just.

This points to the need for further inquiry into power relations and how we engage with each other, including both humans and nonhumans, and invites reflections on what may be referred to as *transformative engagement*. Transformative engagement seeks to go beyond modernist assumptions of control and instead centers on caring practices (Arora 2019). According to Moriggi et al. (2020), such caring practices must be ethically informed and based on relational responsibility and emotional awareness. Linking sustainable development with transformative engagement thus calls for a restructuring of engagement in places where contested research fields, political issues, landscapes, or localities are at stake. One example of this in the context of adaptation is captured in one of the recommendations in the summary for policymakers from Working Group II of the IPCC (our emphasis): “Recent analyses, drawing on a range of lines of evidence, suggest that maintaining the resilience of biodiversity and ecosystem services at a global scale depends on effective and equitable *conservation of approximately 30% to 50% of Earth’s land, freshwater and ocean areas, including currently near-natural ecosystems*” (IPCC 2022, p. 44). According to the United Nations Environment–World Conservation Monitoring Centre and the International Union for Conservation of Nature (IUCN), officially recognized protected areas currently (31 December 2022) cover over 15% of Earth’s land surface and 7.4% of the world’s oceans (IUCN 2023). To follow up the figures for conservation mentioned by the IPCC report, the proportion must increase by a factor of 2–3.3 for land and 4–6.8 for ocean areas, which clearly appears as a transformative and not incremental change.

*b. To adapt to climate change while seeking to avoid maladaptation*

An increasing number of scholars argue that if treated as a separate issue, removed from mitigation and sustainability work, adaptation policies and practices risk undermining mitigation and sustainability efforts, for example, through triggering increases in greenhouse gas (GHG) emissions. When adaptation has such negative consequences, it is termed maladaptation (Klein et al. 2007; Bizikova et al. 2007; Corfee-Morlot et al. 2009; Warren 2011).

The term *maladaptation* has several different interpretations. Juhola et al. (2016) developed a typology for the outcomes of maladaptation: rebounding vulnerability (i.e., adaptation action that increases current or future climate change vulnerability of the involved actors); shifting (or “spill over”) vulnerability (i.e., adaptation action at one specific location that may cause an increase in climate change vulnerability at a different location); and eroding

sustainable development (i.e., adaptation action that increases GHG emissions or negatively impacts environmental conditions and/or social and economic values).

In the latest IPCC assessment report on impacts, adaptation, and vulnerability, a separate chapter is devoted to maladaptation and how to avoid it. The term is defined as “actions that may lead to increased risk of adverse climate-related outcomes, including via increased greenhouse gas emissions, increased or shifted vulnerability to climate change, more inequitable outcomes, or diminished welfare, now or in the future” (IPCC 2022, p. 2915). The authors of the report observe that “there is increased evidence of maladaptation across many sectors and regions since the AR5” (IPCC 2022, p. 27) and go on to identify a number of adaptations that have resulted, or have a high risk of resulting, in maladaptation. These include adapting coastal infrastructure in low-lying coastal systems (with the risk of leading to increased GHG emissions, conflicts with ecosystem services, and equity problems), and adapting water capture/storage to improve water security (with the risk of leading to several equity problems) (IPCC 2022, p. 2604).

*c. To mitigate climate change while seeking to avoid malmitigation*

The term “malmitigation” is defined similarly within the research literature as its twin term, maladaptation. It is understood to imply either ineffective mitigation or mitigation efforts that lead to unintended and negative side effects in society at large (Corfee-Morlot et al. 2009; Scricieua et al. 2013) or increased climate vulnerabilities (Kongsager and Corbera 2015).

The process of malmitigation has thus far received far less attention, and the concept is far less theorized, than that of maladaptation. Malmitigation is mentioned only once in the AR6 report on impacts, adaptation, and vulnerability (IPCC 2022, p. 102), whereas maladaptation is mentioned more than 400 times. Strikingly, the term was not mentioned in the AR6 report on mitigation. While the term is little used, there are examples of studies that address the problem in practice, particularly within the field of renewable energy. The main message within this research is that transitioning from a fossil fuel–based energy system to one mostly based on renewable energy may increase climate risks, especially if such transitions are done rapidly (Bizikova et al. 2007; Warren 2011). It has been estimated that the physical climate risks of a renewable energy system mainly powered by “weather,” all other factors being equal, most likely will be higher than that of the current fossil fuel energy system (Aall et al. 2022).

The general picture, however, is that there is a rich literature addressing the risk that climate change adaptation efforts may cause conflicts with other sustainability goals, including that of reducing GHG emissions, whereas the literature on how GHG mitigation efforts may affect physical climate change risks is scarce (Aall et al. 2016). Thus, there is a lack of knowledge about which requirements climate change adaptation concerns should impose on GHG mitigation efforts.

TABLE 1. Overview of the current research discourse on sustainable climate change adaptation and proposals for how to expand upon it.

	Focus within current research discourse on sustainable climate change adaptation	Proposals for expanding on the research discourse on sustainable climate change adaptation
Thematic context	Mostly aimed at physical infrastructure, urban environment, and tourism	Include other adaptation themes
Geographical context	Mostly focused on adaptation in the Global South	Include adaptation in Global North and comparisons
Sustainability context	Mostly focused on social sustainability	Include ecological sustainability and connections between the two
Relation to mitigation	Mostly focused on avoiding maladaptation with little to no focus on malmitigation	Include the issue of avoiding malmitigation

### 3. Including “sustainability” in the climate change adaptation discourse

In the following section, we first present the results of a literature review on sustainable climate change adaptation, after which we present a proposal for how to further extend and focus the scientific discourse on sustainable climate change adaptation (see Table 1 below for a summary).

#### a. Conceptual development and theoretical background of sustainable adaptation

In the context of climate change research, the term *sustainable adaptation* is relatively new. The concept was first used by climate change researchers in the early 2000s, but most studies lack an explicit definition of the concept and how it differs from other forms of adaptation. The most comprehensive efforts at theorizing the concept of sustainable adaptation occurred between 2007 and 2011, where the concept received increased attention from climate change scholars within the social sciences. The first conceptual approach to defining sustainable adaptation was led by social scientists and human geographers such as N. Adger, S. Eriksen, K. O’Brien, and K. Brown and was rooted in the greater discourse of climate change vulnerability (cf. Adger and Kelly 1999; Eriksen and O’Brien 2007; Fussler and Klein 2006; O’Brien and Leichenko 2007). Eriksen and O’Brien (2007), for instance, define sustainable adaptation as the “interface between vulnerability reduction and poverty reduction measures” (p. 338). In the Human Development Report 2007/08, published by the United Nations Development Program (UNDP), O’Brien and Leichenko (2007) locate sustainable adaptation even broader in the overarching context of human security. Even though the concept is understood to imply the promotion of “more equitable social, economic, and environmental practices” (O’Brien and Leichenko 2007, p. 31), the report refers in essence to the social dimension of sustainability. An “increasing environmental, social, economic and institutional connectivity” (O’Brien and Leichenko 2007, p. 31) is discussed as influential for vulnerability through how it can promote resilience and enhance human security. In these efforts at theorizing the concept of sustainable adaptation, focus is on the linkages between the reduction of both poverty and climate change vulnerability, as well as the need to address those

challenges hand in hand (Eriksen and O’Brien 2007; O’Brien and Leichenko 2007).

The underlying assumption that poverty, inequality, and climate change vulnerability must be addressed in connection to each other is rooted in the recognition that adaptation can be seen as controversial and can have negative consequences (Eriksen 2009; Eriksen et al. 2011). In the context of poverty reduction, Eriksen (2009, p. 40) summarizes that “[a]ny and every adaptation intervention does not automatically reduce poverty and inequality, and some poverty eradication measures could aggravate vulnerability.” This perspective is based on the recognition that adaptation is not only a technical, but a social, political, and normative, process (Brown 2011; Eriksen 2010; Eriksen et al. 2011). The further development of the concept of sustainable adaptation has therefore emphasized the need for questioning governance and existing power structures in the design and implementation of adaptation measures (Eriksen 2010). Brown (2011) further addresses the political dimension of sustainable adaptation by emphasizing the importance of challenging current understandings of development while simultaneously developing alternative and more sustainable development strategies. Together, these critical perspectives have informed the development of numerous conceptual frameworks that call for stronger engagement with decision-making, policy, and power structures in the context of adaptation (Brown 2011; Eriksen et al. 2011; Keim 2011; Macgregor and Cowan 2011; Taylor 2013; van Den Berg and Coenen 2012). Eriksen et al. (2011), for instance, developed an adaptation policies roadmap based on four normative principles to ensure socially just and environmentally integrated adaptation measures: recognizing the context for vulnerability; acknowledging that differing values and interests affect adaptation outcomes; integrating local knowledge into adaptation responses; and considering potential feedbacks between local and global processes. While ecological sustainability is included as a dimension in these works, the authors have taken a distinct social science perspective on adaptation, and emphasis is therefore predominantly on the social aspects of sustainability.

Most social science research that employs the concept of sustainable adaptation after 2011 relies on these above mentioned works and is mostly empirically based, with only few engaging in further theorizing the concept. The concept of



sustainable adaptation does, however, share some commonality with the concept of transformative adaptation, which arose within the adaptation research community around the same time as sustainable adaptation (e.g., IPCC 2012; Nelson 2009; Olsson et al. 2006; O'Brien 2012; Nelson 2009; Pelling 2010; O'Neill and Handmer 2012). This concept similarly focuses on not only addressing risks but altogether transforming the drivers of vulnerability, thus touching on issues of inequality, poverty, and exploitation. It is also used to explore the systems and structures producing the risks, such as carbon-intensive economies and modes of production and consumption.

#### *b. Further development and use of the concept*

In the following, we further outline the ways in which the concept of sustainable adaptation has been used during the past 20 yr, based on four different characteristics: 1) the disciplines and themes within which the concept has been employed, 2) the geographical contexts and scales considered, 3) the understanding of sustainability and the sustainability dimensions emphasized, and 4) the understanding of the relationship between adaptation and mitigation.

#### *c. Characteristic 1: Thematic context*

The concept of sustainable adaptation is applied in a wide array of fields and disciplines. Its use does, however, appear to be following the general debates and theoretical strands of climate change adaptation research occurring within the social sciences in general and human geography in particular.

Sustainable adaptation has received considerable attention within research on housing and urban areas, where it has been used to address urban and spatial planning (Hurlimann et al. 2014; Jeong 2018; Santhia et al. 2018), urban resource management (Sørup et al. 2019), the building sector (Bullen 2004; Love and Bullen 2009; Remøy and Wilkinson 2012; Wilkinson 2014; Alabsi et al. 2016), urban green spaces (Drlik and Muhar 2009), urban climate change mitigation and adaptation (Hritonenko and Yatsenko 2022) as well as more general urban processes and areas (Alabsi et al. 2021; Reckien et al. 2009). More recently, the concept has also been used to analyze more human-centered questions of justice and poverty (Fiack et al. 2021; Donderer 2021) such as displacement (Barua et al. 2017; Lei et al. 2017).

The analysis of sustainable adaptation strategies mainly occurs in research that focuses on the Global South (cf. Chapman and Darby 2016; Hilde et al. 2016; Chinokwetu and Togo 2018; Islam and Managi 2018; Brouziyne et al. 2018; Akhtar et al. 2020; Islam et al. 2021; Mamun et al. 2021; Singh and Singh 2021). It is used to analyze issues such as smallholder agriculture (Bargout 2012) or the potential of agritourism for farmers (Mahaliyanaarachchi et al. 2019), as well as more theoretical questions of human security (Owuor et al. 2012; Taylor 2013), justice (Eriksen and Marin 2014), and adaptive capacity (Eakin et al. 2014).

Tourism is another field that has seen a considerable interest in the notion of sustainable adaptation, as part of the efforts of theorizing what sustainable tourism looks like in the context of climate change (Luthe et al. 2008; Njoroge 2014,

2015; Njoroge et al. 2020; Kaján 2014; Valdivia and Barbieri 2014; Mahaliyanaarachchi et al. 2019).

It is interesting to note that the concept of sustainable adaptation is applied across topics and disciplines that have very different theoretical and ethical commitments. For instance, it is used to analyze more technical and managerial- and engineering-oriented topics such as coastal science and flood protection (cf. van Loon-Steensma and Schelfhout 2017; Bonnett and Birchall 2020; Koch 2020; Marijnissen et al. 2020), water resource protection (Guo et al. 2020), hydropower (Ochieng et al. 2019), and risk management (Singh et al. 2019). On the other hand, it is used in more human-centered fields and traditions, such as in the context of local, traditional, and Indigenous knowledge (cf. Mekonnen et al. 2021; Boogaard et al. 2020; Korovulavula et al. 2020; Akinbami et al. 2016), local and Indigenous communities (Rahman et al. 2021; McNeeley 2017), gender relations (Roy Chaudhuri 2022), and research designs focusing on the individual and household levels (Fasina et al. 2021; Wamsler and Brink 2014, 2018).

#### *d. Characteristic 2: Geographical context*

Articles that discuss sustainable adaptation have tended to do so in the context of either the Global South or the Global North, with an equal distribution between these two geopolitical contexts. More recently, the concept of sustainable adaptation has been applied in research that spans both (cf. Eriksen 2009, 2010; Eriksen and Brown 2011; Eakin et al. 2014; Madzivhandila et al. 2021; Rahman et al. 2021; Bezner Kerr et al. 2022). This reflects a trend toward a more geographically integrated approach to adaptation that calls for “a balancing act between developed and developing countries” (Madzivhandila et al. 2021) and explicitly engages in discussions on the relationships between these geopolitical contexts.

Efforts to address the interrelated and global character of climate change adaptation were initiated by social scientists such as S. Eriksen and K. Brown, for instance, through their 2011 special collection on sustainable adaptation. The special collection sought to address what was perceived as a shortcoming in adaptation research: “that is, the tendency to consider adaptation in developing and developed countries as very separate issues, when human responses are in fact closely interlinked through their direct and indirect effects on other groups and regions” (Eriksen and Brown 2011, p. 3). The works included in the special collection therefore largely discuss sustainable adaptation in the context of global power structures and social justice.

The concept of sustainable adaptation is discussed in different contexts and across scales. There is a tendency for studies that employ the concept to have a main focus on the local and regional scales, including adaptation of households and individuals (see, e.g., Birkmann et al. 2016; Lei et al. 2017; Rosenzweig et al. 2018). This trend reflects the mainstream assumption within both research and policy that climate change adaptation is an inherently localized activity. Thus, while climate change is perceived as a global phenomenon, the need for adapting to the effects of climate change is perceived as being situated within the local area (municipalities, households, etc.) (e.g., Glover

and Granberg 2020). While climate change adaptation studies span multiple scales, only a few studies include several scales in the analysis of sustainable adaptation, such as Vincent et al. (2013), who analyzed how local and national adaptation policies can jointly support sustainable adaptation.

#### *e. Characteristic 3: Sustainability dimensions*

Most of the articles reviewed apply the concept of “sustainability” without defining it. Often the term is used without any further explanation on how it is understood or measured (e.g., Islam and Managi 2018; Mahaliyanaarachchi et al. 2019; Ochieng et al. 2019; Marijnissen et al. 2020; Wilson et al. 2023). This perpetuates a lack of clarity as to the meaning of sustainability (Njoroge 2015) that permeates the entire subfield of sustainable adaptation. As with other “fuzzy” concepts, Brown (2011) warns that “sustainable adaptation” risks becoming an empty “buzzword” that can be used to justify existing unsustainable policies and approaches rather than doing the intended work of ensuring social justice and environmental integrity.

Given the lack of clear applications or definitions within individual studies, it is challenging to gain an overview of which dimensions of sustainability are emphasized and prioritized and why in relation to adaptation. Yet certain patterns can be identified. While the concept of sustainable adaptation was initially defined as “adaptation that contributes to socially and environmentally sustainable development pathways, including both social justice and environmental integrity” (Eriksen et al. 2011, p. 8), focus has largely been placed on the social dimensions of sustainability, including vulnerability, poverty reduction, and development (e.g., Eriksen and O’Brien 2007; Eriksen 2009; Brown and Eriksen 2011). While some more recent works have a similar social justice focus (e.g., Bezner Kerr et al. 2022; Boogaard et al. 2020; Donderer 2021), there has been a significant increase in publications that refer explicitly to both the social and the ecological dimension of sustainability, as well as how they are interrelated (e.g., Chapman and Darby 2016; Chinokwetu and Togo 2018; Fasina et al. 2021; Hashemi et al. 2017; Mekonnen et al. 2021; Rahman et al. 2021). Only a few publications focus explicitly on the economic dimension of sustainability and do so in concert with the social and environmental dimensions (e.g., Alabsi et al. 2016; Huq et al. 2013).

In the context of adaptation policy and intergovernmental collaboration, the concept of sustainable adaptation has only recently been considered. While the concept was included in the Fifth Assessment Report by the IPCC, it mainly referred to empirical cases where the concept had been applied as an analytical lens. In the most recent assessment report (IPCC 2022), however, sustainable adaptation is discussed in more detail, including with reference to the theoretical developments of the concept. These mostly refer to the abovementioned initial theorization by Eriksen et al. (2011), where both social justice and environmental integrity are highlighted but where the social dimensions of sustainability receive the most attention.

The use of sustainability by critical adaptation scholars is explicitly normative; that is, they perform a value judgment as

to the preferability of adaptation that enhances the well-being of people and planet over adaptation that “merely” adapts to an increasingly inhospitable climate. Thus, sustainable adaptation is understood as “better” (for people, ecosystems, and societies) than adaptation that does not have an emphasis on sustainability (e.g., Eriksen et al. 2011; Fiack et al. 2021; Hashemi et al. 2017; Klöck and Fink 2019; Singh and Singh 2021). What makes adaptation sustainable is necessarily context dependent, but scholars using the concept often emphasize the importance of grounding actions in place and considering traditional and local knowledges in adaptation processes (e.g., Boogaard et al. 2020; Mekonnen et al. 2021; Korovulavula et al. 2020).

By adding “sustainable” to adaptation, these scholars have helped broaden the adaptation field to consider issues that traditionally have been perceived as outside the scope of adaptation work [e.g., poverty, questions of (in)justice, power, and normativity, biodiversity loss, and renewable energy technologies]. At the same time, the room for adaptation has also been narrowed in terms of impact, identifying the qualities and values that underpin “good” or “successful” adaptation in the context of sustainability (e.g., equity, thriving, and longevity). Adaptation is thereby moved out of its “technical box” and into the realm of politics and societal debate.

#### *f. Characteristic 4: Relation to mitigation*

Besides working to integrate especially social and environmental sustainability in adaptation work, the concept of sustainable adaptation has also worked to reintegrate the notions of adaptation and mitigation. Climate change is per definition understood as a global phenomenon with the task of mitigating emissions similarly understood as situated within “the global” (i.e., intergovernmental cooperation). When adaptation was first articulated in the context of climate change, it was understood as the need to adapt to climate impacts as they were anticipated or experienced in place, thus at “the local” scale. The two concepts (and how they have been performed in practice) have existed separately, exemplified by the tendency for mitigation to be part of national strategies, while adaptation often is part of municipal and regional planning (Aall et al. 2012).

In research that applies the concept of sustainable adaptation, however, mitigation measures are also frequently mentioned (cf. Singh and Singh 2021; Hritonenko and Yatsenko 2022; Pereira 2011). In these works, adaptation is understood as sustainable to the extent that it also contributes to climate change mitigation. According to Eriksen (2009, p. 44), “The environmental sustainability aspects emphasize that adaptation needs to not endanger the environmental or economic integrity, neither for other groups at present or for future generations. Therefore, mitigation of greenhouse gases becomes an important part of sustainable adaptation criteria.” Islam et al. (2021, p. 1) go a step farther, understanding sustainable adaptation strategies to be “crucial to mitigate climate change impact as well as reduce the loss of natural disasters and increase agricultural crop production.” These authors thereby conceptualize adaptation as a condition for mitigation. Although this understanding is potentially polarizing, by questioning well-established

understandings of climate change adaptation and mitigation, it demonstrates the strong connection and interrelatedness of the two concepts and strategies and shows the relevance of integrating the two under the umbrella of sustainability.

#### 4. The contributions in this special collection

The literature presented in the previous section addresses a variety of different issues, scales, and actors related to climate change adaptation and collectively highlights critical and interrelated challenges in the subfield of sustainable adaptation. The literature emphasizes that both the theoretical and the practical issues of climate change adaptation are characterized by complexity, interconnectedness, and uncertainty. The high degree of continuous interconnectedness is visible between and within the domains of society and nature and is accompanied by the impacts of climate risks from local to global scales and their interdependencies within these scales, manifested, for example, as transboundary climate risks. This interconnectedness, as well as differing understandings of sustainable development and climate change adaptation, demonstrate the high complexity of this field. Among other things, this leads to uncertainties about not only the evolution of climate risks, but also societal responses to them. In the following section, we present the contributions in the special collection about sustainable climate change adaptation and how they engage with the concept.

In the first article, the findings of [Aall et al. \(2022\)](#) highlight the overall relevance of linking sustainable development and climate change adaptation. Based on an analysis of societal risks in the renewable energy sector and the future vulnerability of the energy system to climate change, they conclude that due to the increasing complexity and “tightness” of climate change–related mitigation and adaptation processes, climate risks and thus unsustainable developments could increase and even emerge because of the ongoing energy transition. The authors find that these likely negative consequences are primarily due to existing knowledge gaps. They therefore suggest that critical research and policy efforts in the renewable energy sector be strengthened to minimize the climate risks of the energy transition.

The importance of knowledge production is also underlined in the coproduced case study by [Risvoll et al. \(2022\)](#), which analyzes the impact of institutional, physical, and societal constraints on pastoralists’ adaptive capacities in northern Norway. Their findings emphasize that the process and effects of adaptation are shaped by different approaches and epistemologies that span across scales and contexts while being highly locally rooted and context dependent. This necessitates a comprehensive understanding of vulnerabilities, including but not limited to those caused by climate change. Moreover, they highlight that misrecognition of locally rooted knowledge, often seen as unscientific, can lead not only to conflict but also to negative adaptation outcomes and reduced adaptive capacity. In contrast, their findings show that skillfully incorporating multiple knowledge systems, as well as considering the existence of multiple stressors, interacting drivers of change, and the interrelationships

among them in the context of adaptation, can lead to more sustainable climate change adaptation at all scales.

In their paper about transboundary climate risks, [Harris et al. \(2022\)](#) address not only the importance of broad knowledge production and stakeholder engagement, but also the need for a better understanding of the relationship between scale and place within the context of climate change adaptation. To address the largely neglected transboundary climate risk research and practice, they present a research agenda to facilitate case study research that supports comprehensive, effective, and just pathways to transboundary climate change adaptation. Their approach is based on the impact chain framework but applies additional approaches that include strong stakeholder engagement and coproduction of knowledge to better assess transboundary climate risks. In terms of research on current climate change adaptation, the authors emphasize the fundamental need for more innovation as well as what they define as the inherent acknowledgment of the complexity and interdependency that characterize climate risks and adaptation efforts.

The strong interconnectedness between climate change adaptation and other societal and natural systems is also stressed by [Hessen and Vandvik \(2022\)](#), who address the challenges of climate change and natural ecosystem degradation, which are currently largely treated separately. The authors use the example of Norway to illustrate the importance of incorporating ecosystem conservation and management into climate change adaptation (and mitigation) at societal, policy, and planning levels at all scales. By maintaining fundamental supporting and regulating ecosystem services, climate hazards and risks can be minimized and the tremendous climate buffering and regulating capabilities of well-functioning natural ecosystems can be harnessed. The study underscores that only by acknowledging, understanding, and acting from the broad interdependencies and interactions between climate change and ecological degradation, and societal and ecological systems—what is referred to as the transformation of society–nature interaction—can a sustainable future be achieved.

The need for general acknowledgment of various uncertainties is highlighted by [Aall and Groven \(2022\)](#), not only in terms of the complexity associated with climate change, but also in the context of different uncertainties that are apparent in terms of actual risks as well as exposure and vulnerability and occurrence of climate change–related hazards. The authors have developed a roadmap primarily, but not exclusively, to guide local climate change adaptation policy and decision-making in consideration of these uncertainties, expanding the conventional and limited “predict-then-act” decision-making process to a “reflect-then-act” mode. By accepting that most climate change–related uncertainties cannot be eliminated, diversifying the understanding and description of these uncertainties through technical, social, and political processes, and addressing uncertainties through a reflect-then-act approach, sustainable and cause-oriented climate change adaptation can be promoted.

The importance of acknowledging both the complexity and the uncertainty associated with processes of climate risk is

also a central theme for [Menk et al. \(2022\)](#), who address the elaboration and assessment of climate-related and societal causes of climate risk. By reviewing studies that have used the impacts chain framework and similar frameworks for analyzing climate risk and vulnerability, they obtain useful information about current common challenges and methodological needs in assessing causes of climate risk. This information, in turn, is critical to developing a holistic impact web rather than a linear representation of risks to integrate cause–effect dynamics. By identifying and addressing the underlying and complex processes behind the drivers of climate risk, effective, durable, and sustainable adaptation to climate change can be achieved. As with the other contributions to this special collection, such identification is possible through the extensive involvement of different stakeholders and local knowledge, and the transparent communication of both limitations and uncertainties as well as strengths and certainties in the scientific process.

[Selseng et al. \(2021\)](#) were also able to identify the importance of using clear and transparent language and communication to achieve long-term and sustainable adaptation efforts. In their analysis of the understanding and interpretation of climate change adaptation in Norwegian municipalities, they found that there are different views both between and within science and practice about the climate we need to adapt to, climate risks, and appropriate adaptation measures. Based on their study, the authors emphasize the need for a shared and well-communicated local climate change adaptation framework, as well as closer monitoring of actual adaptation efforts by local municipalities to achieve long-term and sustainable adaptation actions. The key to ensuring these aspects is, first, the use of clear and concise adaptation language with well-defined and explicit terminology and second, the precise definition of how this should be applied to the adaptation mandate at the national level.

Drawing on an empirical case study of adaptation planning from the Russian Arctic, [Bobilev et al. \(2021\)](#) emphasize the importance of actively involving and engaging citizens, supporting bottom-up rather than only top-down approaches, establishing monitoring and feedback loops, and creating transparent processes for successful adaptation planning. In examining the design and implementation of climate change adaptation strategies in urban settlements in the Russian Arctic, they found that a lack of the characteristics mentioned in the previous section is very likely to lead to misidentification of strategic priorities and a shortage of societal support. Based on concepts and discourses of urban climate change adaptation, they analyzed current trends and challenges in adaptation planning in the Arctic zone of the Russian Federation.

The final article by [Antonsen et al. \(2022\)](#) actively focuses on how future, deliberately transformative climate change adaptation efforts can be shaped in the context of sustainable development, thus condensing and extending previous statements on sustainable climate change adaptation. Using a case study of climate change and perceived resilience and adaptive capacity in nature-based tourism in Lofoten, Norway, the interconnectedness among adaptation, resilience, and transformational capacity is demonstrated. The results highlight the importance of being able to consciously transform a system and document the ways in

which the adaptability and flexibility of a system ensure the resilience and transformative capacity of that system. The authors point out that the adaptive capacity of individual actors forms the basis for a system's resilience. Furthermore, the current resilience of the system provides the foundation for transformational capacity, which in turn is a critical determinant of future resilience.

Collectively, the contributions to this special collection provide important theoretical and practical insights into how to design sustainable adaptation research and action that leads to socially just and environmentally sound results. In the context of sustainable adaptation, the key findings of the contributions point to the need for a broader recognition and acknowledgment of the complexity and interconnectedness of climate actions, a strengthening of knowledge production, particularly through increased engagement of diverse stakeholders and locally rooted coproduced knowledge, and the creation of common, coordinated, and transparent adaptation policies, actions, and communication channels. In addition, the need to understand the above-named linkages, as well as the continued flexibility in both research and practical process, and ongoing monitoring of adaptation efforts are important to ensure sustainable adaptation. These requirements, and thus sustainable climate change adaptation, form the basis for transformative adaptation to climate change that is compatible with the goals of sustainable development and actively combines the two, resulting in not only neutral but positive climate change adaptation efforts.

## 5. A proposed framework for sustainable climate change adaptation

In one of the early papers attempting to address and theorize how sustainable adaptation is to be understood, [Brown \(2011\)](#) asks the provocative question, is the concept an oxymoron? That is, if the way that adaptation is generally understood and practiced is incompatible with the goals of sustainability. She concludes that the concept risks becoming a meaningless trope “unless it specifically deals with fundamental problems in the dominant paradigm of unsustainable development” ([Brown 2011](#), p. 21). She warns that without explicitly challenging current models of development and adaptation, “sustainable adaptation may be co-opted to support development-as-usual rather than more radical options which put social justice, equity and environmental sustainability at the core.”

The need for taking a “deeper” approach to adaptation is increasingly emphasized within research, practice, and activism, partly driven by the growing intensity with which both direct and indirect climate change impacts are felt across societies. What such “depth” refers to, however, differs among groups and disciplines. For the degrowth movement, for example, successfully adapting to climate change implies challenging the logics and structures of neoliberal capitalism, to address issues of exploitation and ecological overshoot ([Roy Chaudhuri 2022](#); [Keyßer and Lenzen 2021](#)). Within the discourse on “deep intervention,” most commonly related to the mitigation part of climate policy, such interventions are defined as addressing the “root causes” carried out “through structurally transformative and systemic pathways” ([Morrison et al. 2022](#), p. 1102). However,



TABLE 2. A proposed framework for differing between three modes of climate change adaptation (CCA).

Critical dimensions	Conventional CCA	Weak sustainability CCA	Strong sustainability CCA
Maladaptation	Indifferent to <i>environmental</i> and <i>social</i> sustainability	Must <i>not reduce</i> environmental or social sustainability	Must <i>increase</i> environmental and social sustainability
Malmitigation	No limitations imposed by adaptation concerns on GHG mitigation efforts	GHG mitigation efforts must <i>not increase</i> climate risks	GHG mitigation efforts must <i>decrease</i> climate risks
Process of climate change adaptation	<i>Incremental</i> strategy	<i>Mixed</i> strategy (incremental and transformative)	<i>Transformative</i> strategy
	Mostly <i>reactive</i> and <i>protective</i> measures	Mostly <i>proactive</i> measures	Measures also addressing <i>drivers</i> of societal development
	Expert-based process	Applying requirements of public participation in public planning	Applying principles of coproduction of knowledge

some scholars active within this discourse also question the ability of interventions to disrupt the status quo and address the root drivers of climate change (Morrison et al. 2022.). For the “deep adaptation” movement, adaptation is argued to imply a recognition of what is perceived as inevitable societal collapse and thereby a refocusing on how to plan for and emotionally tackle the hardships involved in such collapse (Bendell 2020). This also includes a discussion on the possibility of repurposing infrastructure to enable a circular economy outside current systems of production and consumption (Yarza Pérez 2022). Within feminist and Indigenous research and activism, there is a focus on “Indigenizing” adaptation not only to reduce harms inflicted by adaptation policy and practice on Indigenous and other socio-politically marginalized communities, but also to center such work on principles of self-determination, respect, and reciprocity (Whyte 2017; Gram-Hanssen et al. 2021; Johnson et al. 2021). Other scholars are emphasizing the untapped potential of human agency and creativity in not only *creating* solutions to climate change but *being* the most powerful solution through cultivating the relationship between individual and collective agency (Sharma 2007; O’Brien 2021).

Noting these ongoing debates, with this special collection, we wish to further illuminate the concept of sustainable adaptation, both empirically and theoretically, to show what it can (and cannot) be used for. Based on the insights from the papers included in the collection, we end this overview by proposing a preliminary framework for differing between the conventional and a far more radical and sustainable modus operandi for climate change adaptation. In our development of this framework, we have taken inspiration from an ongoing process within the European Union (EU) to develop a taxonomy for sustainable economic activities (EU 2020). Although it seems fair to question the transformative potential of any system that is set up to promote the continuation of economic growth (despite being termed “sustainable growth”), the taxonomy is relevant to the issues taken up here, namely, the question of how to ensure that the efforts of meeting the various sustainability concerns do not come into conflict with each other.

The taxonomy seeks to develop a systematic way of evaluating any given economic activity in terms of a set of

predefined environmental objectives (climate change mitigation, climate change adaptation, the sustainable use and protection of water and marine resources, the transition to a circular economy, pollution prevention and control, and the protection and restoration of biodiversity and ecosystems). The EU taxonomy functions in such a way that actors who want to have their economic activities deemed “sustainable” must prove that the activity in question is not in conflict with any of the stated environmental objectives and, in addition, must perform particularly well in relation to a minimum of one of the predefined objectives (EU 2020). Inspired by the idea behind the EU taxonomy for sustainable activities, but omitting the underlying goal of promoting economic growth, we have developed a preliminary framework for how to align the goals of climate change adaptation and sustainable development.

A key controversial issue in interpreting and implementing sustainable development is the role of economic growth (Holden et al. 2014). This controversy is pictured in the debate on strong versus weak sustainability (Lélé 1991; Eisenmenger et al. 2020). The former is an idea within environmental economics which states that “human capital” can substitute “natural capital.” Supporters of this idea focus on the tripartite understanding of sustainable development and the balancing among environmental, social, and economic sustainability concerns. Contrary to weak sustainability, *strong* sustainability assumes that “human” and “natural” capital are complementary, but not interchangeable. Thus, supporters of strong sustainability argue that the desire for economic growth may be equivalent to aspiring to an improved standard of living far beyond what is regarded as ecologically sustainable in the long term. In the table below we have picked up on the differentiation between weak and strong sustainability, which is then compared with an approach to climate change adaptation that has no stated reference to the goal of sustainable development (i.e., “conventional” climate change adaptation).

Based on the literature review presented above, and the various contributions to the special collection of *WCAS* on sustainable climate change adaptation, we have identified a set of critical dimensions (Table 2) and accompanying

TABLE 3. Examples of indicators that can be used to assess the degree of sustainable climate change adaptation.

Critical dimensions	Indicators
Maladaptation with respect to <i>environmental</i> sustainability	GHG emissions Biochemical flows Emissions of “novel entities” Loss of biodiversity Per capita primary energy consumption in industrial countries
Maladaptation with respect to social sustainability	Gini coefficient HDI
Limitations imposed by climate change adaptation concerns on GHG mitigation efforts	Local physical climate risks Transboundary climate risks
Process of climate change adaptation	Choice of strategy (incremental vs transformative) Choice of measures (reactive and protective vs proactive) Extent and nature of participation (expert vs coproduction involvement)

indicators (Table 3) for differing among the three modes of climate change adaptation “conventional,” “weak sustainability,” and “strong sustainability.” The first dimension is about the *content of adaptation* and how to *avoid maladaptation*; the second dimension is about how concerns about physical climate risks must govern the *content of mitigation* and thus help *avoid malmitigation*, whereas the third dimension is about the *process of adaptation*.

The idea behind differentiating among the three modes of climate change adaptation is that what we have termed as “conventional” adaptation does not imply any additional concerns other than to “adapt,” while the two versions of sustainable climate change adaptation must comply with requirements that are consistent with the difference in the two overall terms “weak” and “strong” sustainability.

To allow for concretization of what the proposed framework could imply in practice, we have proposed a set of both quantitative and qualitative indicators for evaluating the sustainability of climate change adaptation efforts, in principle ranging from strategies and programs down to specific policies and measures. These are merely proposals; the specific context for doing such assessment (different countries, different sectors, different levels of governance) should guide the choice of indicators.

As described in the first section of this paper, tackling the challenge of maladaptation implies identifying and, to the extent possible, avoiding unintended and negative consequences of climate change adaptation. When deciding on how to conceptualize the unintended consequences to be included in the proposed framework, we have used the original division of sustainability into *environmental* and *social* sustainability (Lafferty and Langhelle 1999). While we recognize that this is in effect an artificial division (Abson et al. 2017), separating the social and environmental in this way is a pragmatic choice for the purpose of operationality and resonates with the two-word concept of “sustainable” and “development.”

For proposing indicators for *environmental* sustainability, we have found inspiration in the framework of planetary boundaries developed by the Stockholm Resilience Centre (Rockström et al. 2009; Persson et al. 2022). The framework consists of planetary boundaries within which humanity can

continue to develop and thrive for generations to come and defines three thresholds: below boundary (safe); in zone of uncertainty (increasing risk); and beyond zone of uncertainty with respect to passing the boundary (high risk). Currently, three planetary boundaries are assessed to be in the high-risk category: biochemical flows of phosphorus and nitrogen, biosphere integrity (i.e., loss of biodiversity), and “novel entities.”

In addition to the abovementioned indicators, we have proposed “GHG emissions,” although “climate change” is still defined as merely belonging to the “increasing risk” category. We have also proposed a fifth environmental indicator that is of a different nature than those derived directly from the framework of planetary boundaries, namely, “energy use.” The reason for this is the crucial role of “energy” in both the sustainability and climate change discourse. The proposed specification of the energy indicator is derived directly from a very specifically formulated goal in the Brundtland Report of a 50% reduction in per capita primary energy consumption in industrialized countries (World Commission on Environment and Development 1987, p. 146).

For addressing the issue of social sustainability, and the risk of maladaptation, we propose two indicators: the Gini coefficient and the human development index (HDI). The Gini coefficient can be used as an indicator of *social* sustainability. This indicator is the most popular and widely used measure of *inequality* through overviews of statistical dispersions of, most importantly, income (UNDP 2010). As pointed out by Holden et al. (2014), however, equity as required by the Brundtland Report is not the same as equality as measured by the Gini coefficient. Ideally, we would look at the spread of wealth rather than income, but here data quality and access become a challenge. We therefore apply the Gini coefficient but make sure to treat it as an indicator rather than as a measurement of equity.

Another way of thinking about social sustainability is through the concept of doughnut economics, where the environmental “ceiling” described by Rockström and colleagues is coupled with a social “foundation,” creating what K. Raworth (Raworth 2017) has termed a safe *and just* operating space for humanity. In the doughnut economics model, this social foundation consists of health, education, income and

work, peace and justice, political voice, social equity, gender equality, housing, networks, energy, water, and food. Others still suggest that strong social sustainability must also consider people's ability to exert change for a better life and their sense of agency within the larger sustainability discourse (Stirling 2015; Kuenkel 2019; O'Brien 2015; Scoones et al. 2020). To keep the indicator system simple and clear, we suggest also using the United Nations HDI, a choice made in many cases of setting up indicators on sustainable development (Aall and Norland 2005; Linnerud et al. 2019).

The second critical dimension in Table 2 addresses the problem of *malmitigation*, and the requirements here work "opposite" as compared with the first dimension. For the second dimension, the *adaptation sphere* is the "sender" and the *GHG-mitigation sphere* is the "receiver" of the requirements. The proposed indicators are about climate risks, and we have chosen to differentiate between local physical climate risks and transboundary climate risks. See the special collection contribution by Harris et al. (2022) for a detailed description of the difference between these two concepts of climate risks. Also see the contribution by Aall et al. (2022) for an example of how GHG mitigation efforts (that of increasing the share of renewable energy in the energy system) may produce new climate risks.

For the third critical dimension, on the *process* of adaptation, we have differentiated between a strategic and practical level in terms of the choice of measure. For the *strategic* level, we can make distinctions that separate incremental and transformative adaptation, applying the differentiation outlined in the glossary of the IPCC AR6 report on impacts, adaptation and vulnerability. Here, *incremental* adaptation is defined as "extensions of actions and behaviors that already reduce the losses or enhance the benefits of natural variations in extreme weather/climate events," while *transformational* adaptation is defined as "adaptation that changes the fundamental attributes of a social-ecological system in anticipation of climate change and its impacts" (IPCC 2022, p. 2899).

For the *practical* level, we lean on commonly used terminology within civil protection and the DPSIR (driver–pressure–state–impact–response) framework applied first in an environmental context by the European Environment Agency in the mid-1990s (European Environment Agency 1995). Thus, we differ between *reactive* measures aimed at improving the immediate response to climate hazard events (e.g., increasing the capacity of carrying out rescue operations); *protective* measures aimed at reducing risks through improving protections against climate hazards (e.g., extending flood protection installations); *proactive* measures aimed at avoiding risks (e.g., defining risk zones in land-use planning with a ban on the construction of new buildings); and measures aimed at changing *drivers* of societal change that produce risks [cf. the concept of risk society discussed by scholars like Perrow (2007)]. See also the special collection contribution by Selseng et al. (2021) for a description of the distinction between effect-oriented and cause-oriented climate change adaptation.

Finally, in terms of participation within adaptation processes, we distinguish between processes that rely entirely on expert knowledge and top-down decision-making, as is common within

conventional climate change adaptation strategy and practice (Eriksen et al. 2021), and processes that draw on and support bottom-up decision-making and local process ownership. We further distinguish between two modes of participation along the lines of weak and strong sustainability, namely, participation that includes stakeholders and local knowledge as a supplement to expert knowledge, and participation that is based on logics and criteria derived from cocreation methodologies (e.g., Schreuder and Horlings 2022; Schneider et al. 2021). While the former is increasingly common within certain sectors, partly due to requirements to include citizens in hearing processes, the latter is less common and perceived as being more time consuming due to its insistence on engaging with power structures and differences in opinions and worldviews. Research on sustainability transformations, however, increasingly highlights the importance of taking the time to generate a safe space for knowledge cocreation and genuine participation, to avoid the tendency of token participation (Dannevig et al. 2022). Cocreation is seen not only to generate results that are less conflict prone, but also to tap into the agential potential inherent in everyone to contribute toward creating a sustainable present and future (Charli-Joseph et al. 2018; Fazey et al. 2018).

Through the proposed framework and the articles included within the special collection, we wish to expand upon and deepen the debates surrounding sustainable adaptation. We wish for this work to help enable the concept to do its intended work: ensuring that adaptation policy and practice not only "does no harm" but actively contributes toward enhanced environmental integrity and social justice now and in the future.

*Acknowledgments.* The article is funded by grants from the Norwegian Research Centre on Sustainable Climate Change Adaptation (Noradapt), financed by an annual basic funding from the Norwegian Research Council.

*Data availability statement.* This article exclusively relies on already published data in the form of journal articles.

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