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Transforming places together: transformative community strategies responding to climate change and sustainability challenges

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Abstract

The simple evidence of global temperature rises, changing rainfall patterns and more frequent or extreme weather events are indisputable and will severely impact communities and society as a whole. Conventional strategies and incremental adaptation are not sufficient to address climate risks and sustainability challenges, therefore scholarly attention has shifted to the concept of transformation. A major driver of deliberate transformative responses are bottom-up processes of communities and citizen collectives, able to take the lead. An increasing and wide variety of grassroots community initiatives is emerging, responding to climate risks and sustainability challenges. These bottom-up processes require agents' capacities to implement place-based transformative solutions aligned with climate goals in different contexts.

Based on a literature review and an analysis of online cases the research provides insights into strategies of community initiatives and how their practices illustrate different dimensions of transformative adaptation. Key conditions for transformative adaptation by communities turn out to be capacity-building, leadership, different forms of scaling, and an inclusive, enabling governance. Community initiatives provide an entry point for new novelties and strategies in support of radical transformative ideas. While these initiatives are place-based, there is the need to diffuse and embed these novelties in wider scales to purposely increase their transformative societal impact.

Keywords: Community initiatives, Leadership, Transformation, Climate change, Scaling

Introduction

The Sustainable Development Goals (SDGs) and the Paris Agreement on Climate Change call for deep transformations (Sachs et al. 2019). Transformations are urgently needed in a range of areas to achieve the 2030 Agenda for Sustainable Development and long-term sustainable systems but there is a worrying lack of consensus in how to do this in practice (Horan 2019). Transformations have become even more relevant in the context of climate change, which has become urgent and indisputable. The simple evidence of global ambient temperature rises, changing rainfall patterns and more frequent or extreme weather events will severely impact communities and society as a whole (Bendell 2018; González-Eguino et al. 2017, Wallace-Wells 2019; Wiseman 2021). Both people and ecosystems have been adapting to these climate-driven changes with the idea to adequately live with climate change and its associated risks and impacts (Ajulo et al. 2020). Incremental adaptation and coping strategies do provide communities with short-term solutions to climate risks. However, this is not sufficient to protect communities from greater risks in the future. Incremental adaptation

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responses lack to address the current structures, systems, behaviours and its associated lock-ins, path dependencies and vested interests that contribute to social vulnerability (Boon et al. 2021; Fedele et al. 2020; Hölscher et al. 2020; O'Brien 2012; Ribot 2014). Rather they are reactive, local and short-term responses that are likely to be maladaptive (Cameron 2012; Pelling 2011; Simon et al. 2020), because the effects of long-term environmental change are marginalised and adaptation options that challenge the status-quo are downplayed (Stafford Smith et al. 2011). Adaptation so far has led to governance strategies that have failed to stay below the global Paris agreement goal of 1.5° temperature, which will result in cascading climate risks and catastrophic climate scenarios (Bendell and Read 2021; Kemp et al. 2022). Scholarly attention has therefore shifted to the concept of transformation addressing the root causes of climate risks.

The common thread in these debates on sustainability challenges and climate urgency is the acknowledgment that instead of incremental adaptation and coping strategies, there is a need for more transformative long-term strategies and responses responding to climate change and towards sustainability. The body of literature on transformation includes transformative pathways to realize mitigation (Clarke et al. 2014), transformations in order to adapt to climate change impacts (Fedele et al. 2019; Lonsdale et al. 2015; Revi et al. 2014), transformations as radical change to a 'good Anthropocene' (McPhearson et al. 2021), sustainability transformations (Kuenkel 2019; Lam et al. 2020a; Horlings et al. 2020b) and social or societal adaptation to climate change (Leichenko and O'Brien 2020). In essence transformation is about change, but it is not synonymous with change. For most authors, it implies change that is more than routine: a fundamental alteration of state (Tschakert and St Clair 2013; Feola 2015). It addresses the root causes of climate risks and sustainability problems, shifting systems away from unsustainable, unjust and unequal trajectories (Ziervogel et al. 2021), to achieve more sustainable futures. A major driver of deliberate transformative responses to the current challenges are bottom-up processes in which communities are able to self-organise (Ajulo et al. 2020). An increasing and wide variety of grassroots and community initiatives is emerging, responding to climate risks and sustainability problems. Conditional for such initiatives are local participation and partnerships fostered through social networks, research, social innovation and trust among all stakeholders (Engle 2017). However, there is limited understanding so far of how societies and communities have attempted to reduce their vulnerability to climate change (Fedele et al. 2020).

The literature suggests that leadership plays a key role in developing place-based transformations to climate change and sustainability problems, supporting capacity building, 'inner' transformation and scaling of successful practices. While disconnected local initiatives cannot address the challenges that communities are facing, leadership can connect actors and initiatives across geographical scales and political levels, working towards systemic change (Castro-Arce and Vanclay 2020; Parés et al. 2017). However, we need to better understand how and under which conditions deliberate community responses can develop into transformative strategies (Huntington et al. 2017) and how leadership plays a role in this.

This article analyses existing literature on transformative adaptation and sustainability transformations to address these knowledge gaps. In particular, this research will provide insights into strategies of community initiatives and networked movements in Europe and the role of leadership. The following research questions are guiding this research:

1. What transformative responses are developed by communities and networked movements in Europe?
2. How do their strategies and practices contribute to scaling?
3. How can (potentially) leadership play a role here?

The next section will elaborate on the methodology used including an overview of networked community initiatives and movements in Europe. "Can we define transformation?" section describes the results of our literature analysis on the concepts of transformation and transformative adaptation in the context of climate change and sustainability challenges, what commonalities can be found in the literature and what tensions this brings when operationalizing the concept, resulting in a framework for analysis. "Dimensions of transformations in practice" and "Community strategies and examples" sections 4 and 5 analyse how communities address different dimensions of transformation and which strategies they develop, illustrated with exemplary cases. The "Discussion" section reflects on the results and the (potential) role of leadership to support transformative strategies and scaling processes and the article ends with conclusions and suggestions for further research.

Methodology

We used a literature review to provide a state of the art overview on transformation and transformative adaptation. We then analysed literature, 'grey' documents and sites to find empirical information on transformative community responses in Europe and relevant exemplary cases to illustrate these responses. The results

of our literature review are synthesised in to the next line "Can we define transformation?" section.

Literature review

This paper brings together a narrative (Green et al. 2006) and analytical review approach to provide an overview of the main debates in the field, assessing how the field is moving forward, and exploring the key concepts derived from our central research question. Our goal is therefore to explore themes across recent scholarship and synthesise insights from multiple perspectives (Sovacool et al. 2018). Given this goal, we do not pursue an exhaustive, systematic review, but identify key themes and relevant important insights, and suggest avenues for further research based on our reading of the literature.

We started our literature review by carrying out a query in the Web of Science and Scopus. Keywords were used to search for articles on community responses to climate change. Additionally we searched specifically for articles on scaling and leadership, following from the research questions. This resulted in a list of keywords clustered around (1) transformation, (2) local communities, (3) leadership and (4) scaling (see Table 1 in the Supplementary materials for all keywords). The abstracts of the articles were scanned to determine which articles were relevant to include in the literature review, guided by the research questions. This resulted in a list of in total 74 articles. These articles were analysed per cluster. A combination of deductive codes and inductive codes based on the keywords was used to analyse aspects of transformation and identify community strategies and dimensions of transformation.

Analysis of networked movements and cases

A review of literature and documents online was conducted to make an inventory of networked initiatives and movements and examples of transformative community responses to climate change and sustainability challenges. First, we searched via academic articles, European research and policy networks, websites of research institutes, project reports and research activities of individual researchers. We acknowledge this list is by no means exhaustive, and only surfaces the identifiable community networks via internet search, as many interesting initiatives and movements cannot easily be found or are not presented online. However the table provides a first overview to illustrate the variety of movements and cases, showing a continuum from local place-based initiatives towards more networked umbrella organisations on an European or global scale, or a combination of both (see Table 1).

These movements and initiatives focus on different dimensions of transformation: social, culture, ecology, technology, economy and governance. Some networks have been set up as a temporary program such as Sharing Cities, that addresses some of the most pressing urban challenges facing today's cities such as energy use, low carbon transport and buildings. Some networks focus on the development of knowledge (Climate-KIC), providing inspiration (Communities for Future) and supporting learning and collaboration between initiatives (Ecolise, Sharable city, EU Islands Initiatives) or addressing specific themes such as coastal risks (Coastal Communities networks). Some focus on place-based initiatives while

Table 1 Networked community initiatives and movements

Name	Goal
C40 Cities	Develop and integrate an inclusive climate action plan in cities
Sharable city	Share, connect and empower urban sharing initiatives
Communities for future	Support communities that are building a healthier, fairer, regenerative world by sharing stories and addressing their importance in policy.
ECOLISE	Engage in, support and facilitate accelerated learning and collaboration among community-led initiatives on climate change and sustainability, their networks and partners in order to catalyse systemic transformation within and across society.
EIT Climate-KIC	European platform on knowledge and innovation to accelerate the transition to a zero-carbon, climate-resilient society, generating options and pathways for transformation and system change
EU Islands Initiative	Network of exchange for island communities to accelerate the transition to clean island energies from bottom-up
Doughnut Economics Action Lab (DEAL)	Network for communities, governments and organisation to reimagine and remake the future
Coastal Communities Network Scotland	A collaboration of locally-focused community groups (communities of place)
Global WDF Initiative: Ocean Witness	Network to share stories about community action for coastlines protection
Transition Network	Global network of grassroots transition movements

being networked as well (Transition Towns, Eco-village network). The analysis of initiatives was based on the aspects of our conceptual framework: dimensions, strategies, scaling, and leadership. To illustrate the strategies we included exemplary cases of place-based initiatives selected from different geographical contexts, showing the variety of concrete practices on the ground. Some cases were found with the help of colleagues and other experts, but most cases were found online.

Can we define transformation?

Literature review

Transformation accounts for innovative and major long-term shifts and systemic changes from current trajectories towards alternative pathways across whole regions, communities or ecosystems on multiple scales. We apply a broad perspective here including notions on transformative pathways addressing climate change, transformative adaptation, social and societal adaptation and transformations to sustainability (in the context of climate change). While we focus in this article on transformation as a (continuous) process, such processes can potentially also result in transformative practices or transformative learning.

According to Deubelli and Mechler (2020) and Fedele et al. (2020) transformations adapting to climate change can actively be initiated when the severity of climate change impacts is expected to rise, when current adaptations are reaching their limits or when climate-driven change already has occurred. Some authors have referred to the 'dark side' of transformation and the risks in sustainability discourses pointing to for example the impact on social injustice (Blythe et al. 2018). Transformative adaptation has been characterised as restructuring, path-shifting, innovative, multi-scale, system-wide and persistent (Fedele et al. 2019). Transformation thus requires change across many dimensions and at different scales (Lonsdale et al. 2015; Moore et al. 2015). Some authors have added a personal or 'inner' dimension to processes of transformation. O'Brien and Sygna (2013) who refer to societal adaptation, make a distinction between spheres of transformation, including a practical, political and personal sphere. The personal sphere encompasses *"changes in meaning making, which includes the individual and shared beliefs, values, worldviews, and paradigms that shape attitudes, actions and perceived options"* (Leichenko and O'Brien 2019, p. 192). This refers to the inner dimension of transformation or 'change from the inside out' (Horlings 2015a, b). Part of this personal or 'inner' sphere are worldviews—the inescapable and overarching frameworks of meaning and meaning making that profoundly inform our very understanding and enactment of reality (Hedlund-de Witt et al. 2014; Riedy 2013).

Despite the rapidly increasing body of literature on transformation, it remains difficult to operationalise this concept empirically. A strict or narrow definition would probably also do no justice to the rich and wide field of community initiatives, citizen collectives and transformative experiments, aiming to practically implement and experiment with transformations in varied ways and in different contexts 'on the ground'. Forms of collective action show a variety of aims, strategies and actions, which are difficult to capture under a too narrow definition. We would argue that—similar to debates on sustainability and resilience—a concrete definition might also not be desirable as transformation is not an outcome but a process, non- linear, and not predictable. Solutions and new pathways might be needed which cannot be imagined yet. Climate action and sustainability pathways should ideally encourage '1000 flowers to blossom', supporting multiple transformational pathways towards a more just, equitable and sustainable future.

Community initiatives and movements—though they might be focused on autonomy and self-organisation—benefit form forms of governance which consider transformative change in a more plural way including multiple voices (Blythe et al. 2018), giving attention to issues of power and justice (Ziervogel et al. 2021) and enabling community initiatives in a financial, regulatory or communicative way. Initiatives do not function as autonomous islands and often need some form of governance support, e.g. subsidies or room to manoeuvre. Policies that support processes of co-creation help communities to build collective power. Such governance can ensure successful implementation when (1) building on a shared understanding of vulnerabilities among different stakeholders and how these vulnerabilities can be overcome, (2) empowering and shifting agency towards communities, and (3) supporting a sustained process of collaborative, life-long learning that positions transformation as a communal competency (Ziervogel et al. 2021). While this article deals with the role of community initiatives and movements we by no means suggest that they carry THE solution or are solely responsible for navigating the climate crisis. The contribution of private companies to global warming in sectors such as transport and agriculture should not be underestimated. Furthermore, an ambitious and clear political agenda facilitating a system change of our economic system is needed, including the necessary financial investments and regulatory frameworks, and taking into account issues of social justice, wellbeing and solidarity.

As transformation is dependent on the local institutional and cultural context, this would require a

place-based approach (Chung and Fook 2017; Huntington et al. 2017; Ziervogel et al. 2021), resulting in a variety of local and regional strategies and responses. Place-based institutions (Rodriguez-Pose 2013) can facilitate change, while we should also recognize the tension between place-based approaches—rooted in local assets and characteristics with the need for upscaling and system-wide and multi-scale pathways (Hermans et al. 2016). Though the literature on transformation and transformative adaptation and sustainability transformation is varied we have identified some commonalities in the literature:

1) System-wide change, persistent and restructuring

Transformation aims to change the root causes of risks and vulnerabilities in the long-term by shifting systems away from unsustainable or undesirable trajectories towards more equal, just and climate-resilient development pathways (Fedele et al. 2019; Lonsdale et al. 2015; Pelling 2011; Revi et al. 2014; Ziervogel et al. 2021). It is therefore *system-wide*: occurring at large scale in ecosystems, landscapes or societies (Fedele et al. 2019). Instead of accommodating change, it contests change by challenging the existing power and governance structures, norms, values and worldviews that may impede change (Deubelli and Mechler 2020). It tries to alter the fundamental societal structures, values, behaviours and paradigms that contribute to the existing inequalities and injustices (Hölscher 2020a, b). This also means that transformation includes processes of *restructuring:* creating major shifts in properties, functions or interactions between the social, ecological or socio-ecological system (Fedele et al. 2019). On top, it is *persistent:* future-oriented and focused on long-term planning, but not necessarily irreversible.

2) Mitigation, social transformations and social innovation

Transformations challenge the 'status-quo' and 'business-as-usual' by creating new alternatives and opportunities (Hölscher 2020a, b) including strategies that reduce and prevent CO2 emissions, shifting from the use of fossil fuels towards clean energy production. Therefore, transformations can include mitigating greenhouse gasses as well as social adaptation, taking into account issues of social and environmental justice, equity and power relations to avoid increasing inequalities between people, communities and between places. Scholars have for example made pleas for social sustainability based on human needs to address not just biophysical limits but also ensuring a foundation for social wellbeing, adopting alternative economic models such as the doughnut economies (Raworth 2017; Turner et al. 2021). Transformation requires not just technical innovations but also social *innovations* and a re-evaluation of the relations between people and nature (Ajulo et al. 2020; Fedele et al. 2019), multi-stakeholder collaboration and the use of traditional, local and indigenous knowledge from local communities.

3) Capacities

Conditional for specifically transformative community initiatives is the building of human capacities. Hölscher (2020a) has identified and operationalized four capacities that underpin how diverse actors, including local communities, can develop and contribute to the implementation of transformative climate governance. These capacities have been linked here to strategies:

- Stewarding capacity: anticipating, protecting and recovering from uncertainty and risk. A strategy that supports the generation and co-creation of knowledge, monitoring and learning can support this type of capacity.
- Unlocking capacity: recognising and dismantling unsustainable path-dependencies. Experiencing pressure is conditional here to break open the potential resistance to change. This can be linked to strategies supporting inner transformation.
- Transformative capacity: enabling, diffusing and embedding radical innovations. Enabling such innovation can gain traction and become embedded for more enduring change, supporting for example place-shaping strategies.
- Orchestrating capacity: coordination of multiple actors/networks and meditation of knowledge, contacts and ideas across sectors and scales which not just creates a context for cooperation but can also support scaling strategies.

4) New pathways building on agency

According to Fedele et al. (2019) transformation aims for new pathways of sustainability, resilience, vulnerability or equity by pushing the systems' current trajectory towards alternative directions. Opportunities for catalysing new pathways exist in re-evaluation and learning approaches that question current assumptions and worldviews, or by taking advantage of windows of opportunities that arise (Fedele et al. 2019). The potential emergence of new systems' configurations or 'positive tipping points' is dependent on deploying transformative

capacities of agents in systems such as energy systems, governance, social-cultural, technology systems, resources systems and economy (Tàbara et al. 2018, p.124). In line with evolutionary resilience (Davoudi et al. 2013) and the theory of transformation without disruption (Nohrstedt and Nyberg 2015), transformation (literature) recognizes that it is often the complex, adaptive and evolutionary nature of communities that brings about transformation (Ajulo et al. 2020). The evolutionary capacities of societies, bottom-up actors and processes appear to be major drivers of transformation. Citizens for example have become active innovators, self-service providers or small-medium enterprises establishing sustainable businesses that demonstrate sustainability in practice (Frantzeskaki et al. 2016). These actors often act collectively in networks and partnerships (Hölscher et al. 2020). Community initiatives or movements are known to provide spaces for experimenting and learning that produce alternative and sustainable strategies, practices and pathways (Huntington et al. 2017; Ajulo et al. 2020). Especially the interplay of various bottom-up actors provides opportunities and spaces to re-value dominant worldviews and to co-create, experiment and learn with new ideas to promote new adaptation options (Fedele et al. 2019; Lenz and Shier 2021). While most literature focuses on human agency, we seen an increasing number of in-depth publications that analyse agency from a non-human or more-than-human perspective (Pisters 2022; Morris 2022).

Analytical framework

Transformation recognizes climate change and sustainability problems as windows of opportunity to shift towards more progressive and adaptive systems (Chung and Fook 2017). An integrated, integrative and *multi-scale* perspective is crucial here. Firstly because both climate change and sustainability problems have impacts across multiple scales (trophic, spatial, jurisdictional or sectoral), secondly because transformations lead to large scale systemic changes across whole regions, ecosystems, landscapes or communities and thirdly because this requires a multi-scale governance perspective across sectors. An *integrative* approach can be represented through a social-ecological systems approach (Fedele et al. 2019) and through the heuristic of the described three spheres of transformation: the practical sphere (behaviour and technical responses), political sphere (systems and structures) and the personal sphere (beliefs, values, worldviews and paradigms (O'Brien and Sygna 2013). A transdisciplinary approach to transformation also allows for an *integrated* transformation addressing multiple dimensions as described below.

Dimensions

An integrated perspective on transformation addresses both the goal of reducing climate risks, issues of social justice and the root causes of risks simultaneously, including different dimensions of transformation:

- Social: rethinking social relations and individual's values and behaviour;
- Culture: protecting/changing livelihoods based on local and indigenous knowledge;
- Ecology: restoring and safeguarding (circular) ecosystems to maintain livelihoods;
- Technology: increasing self-sufficiency in energy supply;
- Economy: reframing the economy into a local and sharing economy;
- Governance: changing the agency to govern and decide.

Strategies

Citizens and communities (re-)shape urban places addressing societal challenges. They take on roles that they consider as missing, underperformed or ineffective in governance and planning, resulting in a variety of practices (Horlings et al. 2021). Initiatives and movements deploy varied strategies. A key condition seems to be capacity building and the creation of spaces for collaboration, experimentation and reflexive learning that support co-creation at the grass-roots/community level and empower bottom-up actions of local communities (Hölscher 2020a, 2020b; Ziervogel et al. 2021). Capacity building for transformative adaptation relies on two aspects. A first aspect is co-creation at the grassroots/community level to generate knowledge and to self-organise through ongoing monitoring and learning processes (Hölscher 2020a, 2020b; Ziervogel et al. 2021). Collective learning, governance and decision-making at the community level helps to empower communities (Fisher 2021) and shifts power and agency to communities in order to co-create a shared and sustained narrative (collective framing) that reflects local needs and conditions. Second, community empowerment helps to implement adaptive responses and provides communities with a transformative capacity to enable novelty creation and radical ideas aligned with their local place-based needs (Hölscher 2020a, 2020b).

Scaling

Various scholars have studied how bottom-up actors can connect with wider socio-spatial levels and scales to increase their transformative potential (Castro-Arce and Vanclay 2020; Lam et al. 2020b; Van Lunenburg et al. 2020; Moore et al. 2015; Omann et al. 2019;

Westley et al. 2014). These scholars identified some key challenges, including the lack of a stable and facilitative context and the lack of energy and time people face to act upon innovative ideas. Even when scaling is successful, initiatives run the risk of losing excited and engaged people (Westley et al. 2014). The literature acknowledges that most probably a combination of different scaling processes is needed to foster system-wide and multi-scale change, varying over time. While Moore et al. (2015) identified three scaling processes: scaling-out, scaling-up and scaling-deep, Lam et al. (2020b) identified various amplification processes to increase the transformative impact of sustainability initiatives while Omann et al. 2019 focus on the link between scaling and learning. We build here on these authors making a distinction between:

1) *Scaling out* of an initiative, which refers to processes that aim to impact more people and places by increasing the number of initiatives or innovations. It involves replication of innovations in other places or spreading core principles and approaches to other places.
2) *Scaling up:* increase impact beyond the initiative by providing the necessary institutional shifts in law, policy and resource flow.
3) *Scaling deep*: increase impact beyond the initiative via a change in subjective and intersubjective values, relationships and cultural practices that support a durable system-wide change.
4) *Scaling within*: These processes seek to increase the impact within a specific initiative either through stabilising activities or speeding-up activities. Speeding-up processes increase the pace or the efficiency of the initiative. Stabilising processes help to strengthen and embed initiatives in their context, making them more resilient to up-coming challenges.

The literature suggests that scaling out or up is not enough, unless they are achieved through scaling deep processes, supported by learning processes that allow innovations to translate into durable systemic changes. Despite the importance of scaling to support durable systemic change, there are only a few studies that describe how the impact of initiatives can be stabilised or how initiatives can change values and mindsets (scaling deep). Van Lunenburg et al. (2020) reviewed 113 studies to analyse the scaling of initiatives. They found that the variance of scaling strategies is explained by the structure, but is mediated by actor characteristics such as entrepreneurial and leadership skills.

Leadership

The literature indicates the relevance of leadership skills to support scaling. Leadership means acting in ways that influences other's ability to have agency which can result in the restructuring of power relations (Knuth 2019). Leadership within communities, initiatives and movements and civic movements has been acknowledged in literature (Crutchfield 2018), and has been conceptualised as place leadership (Sotarauta and Suvinen 2019), new civic leadership (Hambleton 2015a, b) or collective leadership (Quick 2017; Gram-Hanssen 2021). In the literature, traditionally, a divide can be witnessed between leadership analysed as individual change or collective change. However, the attention has shifted to leadership as a collective activity (Crutchfield 2018; Meijerink and Huitema 2010) which requires diverse human competencies. Recent literature focuses on the integration of both individual and collective leadership (Hambleton 2015a, b; Quick 2017; Knuth 2019; Gram-Hanssen 2021). (Gram-Hanssen 2021, p.18) for example argues that leadership processes for transformation in communities is something that is "inherently collective and emergent while simultaneously being dependent on individuals 'showing up' in everyday situations and contributing with their unique skills and perspectives toward the greater good". Thus, for a comprehensive understanding of how deliberate transformational change happens in communities, both individual and collective leadership have to be taken in to account, which can be termed as individual-collective simultaneity: the continuous process in which individuals act in relation to the group to enact transformational change (Gram-Hanssen 2021).

Dimensions of transformations in practice

The literature review showed the relevance of an integrated perspective on transformation, addressing multiple dimensions. Below we have first analysed the initiatives and movements along these dimensions based on available information about the initiatives, while in the next section we will identify different strategies, illustrated by more concrete exemplary cases of practices on the ground.

Social dimension

This refers to interactions between people within and between communities to support social cohesion or collaboration and personal capacities of reflection, empathy and joy. While both the individual and collective level are relevant here, collective action is more often mentioned, with regard to engagement, social cohesion, reciprocity, reflection or celebration. Social transformation on the individual level is less mentioned, though this has been

addressed in studies about eco-villages linked to the inner dimension of transformation (Morris 2022; Pisters 2022). The Transition Movement refers to this inner dimension as 'an exploration of the processes and phenomena going on within ourselves that shape how we do Transition' (Beattie 2021a). It entails changing one's personal behaviour on, e.g. consumerism in order to make more healthier, resilient, connected and caring choices, based on individual and collective needs and connections with the natural world from a biospheric value perspective. The movement provides resources and practices for individual personal development, including self-resilience or self-care. There is also a more profound focus on ecology, culture and/or changing governance dynamics.

Governance dimension

Proposing alternative ways of governing that restructure power relations can yield learning processes, enabling a change in social structures. The networked movements act upon these questions by promoting a shared sense of agency through participative, collaborative and co-creative decision-making processes. The C40 initiative for example is a network of nearly 100 world-leading cities collaborating to deliver the urgent action needed to confront the climate crisis. The governance dimension is addressed by developing forms of collaboration and by raising critical questions on who has the agency to govern and decide.

People active in the Doughnut Economics Action Lab (DEAL) are collectively reimagining and rethinking the future, for example in Devon (Devon Doughnut 2021a, b). Participants co-designed the principles of the movement, adapted it to the context of Devon and co-created a joint narrative that people can relate to. This form of co-creating a shared problem and vision based on local knowledge 'gives agency to citizens, small businesses, community groups and local policy-makers and shows them how to build a shared pathway to action' (Devon Doughnut 2021a). It opens up opportunities for participation and deliberation that can promote critical views and practices. This ensures both a distribution of agency (Lam et al. 2020a), as well as learning processes through understanding different knowledge, values, attitudes and skills. Taken together, it can question current worldviews and drive people to actively change their behaviour and social structures (Pellicer-Sifres 2020).

Cultural dimension

This refers to the protection and change of livelihoods based on local and indigenous knowledge. It includes attention for spiritual and emotional values of nature (biospheric values) based on less anthropocentric worldviews and a focus on local identity, place and kinship relations (altruistic values). Cultural practices can support a more plural and inclusive understanding of how the world works and changes and to embrace the diversity of responses to climate change (Lam et al. 2020a), including different ways to connect with nature, the environment and all living beings (Berkes 2018; Wiseman 2021).

For example some eco-villages deliberately include a non-human or more-then human perspective in their daily practices (Morris 2022; Pisters 2022). With regard to the cultural protection of livelihoods Ocean Witness supports coastal community-led conservation, sharing various stories of community-led conservation actions, using these values to balance resources while maintaining fishing and tourism in coastal regions. Fisherman associations ensured the establishment of a coastal marine protected area, a local fishing label for regulating legal fishing, and a use of selective fishing techniques that allow non-targeted fish mammals to leave unharmed.

Ecological dimension

This refers to the restoration of original ecosystems or the development of circular systems within their communities. For ecosystem restoration, a variety of practice-oriented actions can be taken such as re-vegetation or increasing soil fertility and biodiversity, as well as more regulatory actions such as community-led campaigns. For example the coastal network in Scotland (CCN) connects 19 community groups who work on protecting and restoring the local marine environment and aim to get their voice heard in the management of coastal protection, while developing environmentally sustainable socio-economic activities. The communities run initiatives for seaweed harvesting, seabed reform, native oyster and seagrass restoration with help of community-led monitoring and designating No-Take-Zones (NTZ), which has led to empowerment and a sense of ownership of the protected areas.

Other initiatives and movements apply permaculture and organic gardening principles to grow seeds, food and protect the soil in relation to local conditions for a regenerative local ecosystem. For example many eco-villages adhere to these principles, considering their green environment as part of a larger ecosystem, illustrated in their practices of harvesting, growing local seeds, composting and the recycling of greywater.

Economic dimension

This dimension includes the support of a sharing and local economy, sometimes referred to as 'REconomy' or 'Doughnut Economy'. The Ecovillage Network for example encourages communities to 'support and prioritise enterprises that regenerate and enrich our local

economy' (GEN 2021). Locally owned enterprises are supported or set-up such as off-grid energy systems or food businesses. These practices refer to what Gibson-Graham et al. (2013) and Raworth (2017) have described as rethinking and reframing of the economy in a more regenerative and distributive way based on values such as cooperation, care, generosity and solidarity. The diverse economy (Gibson-Graham et al. 2013) includes a wide diversity of non-capitalistic economic practices, such as non-profit businesses, worker collectives and alternative capitalist enterprises many of which are ignored or devalued by mainstream economic theory. The re-thinking of the economy based on collaboration, generosity and mutual support opens up opportunities for a sharing economy.

Communities in Valdisieve (Italy) as part of the Transition movement for example encourage enterprises to adopt transformational green entrepreneurial thinking based on social and environmental values instead of business-as-usual and money-based values. Similar to this, the Suderbyn Ecovillage developed common household appliances, workplaces, transportation pools, mini libraries and social areas that serve as an infrastructure for sharing.

Technological dimension

This refers to technological innovations often managed in a local and shared way. Communities aim to become self-sufficient in the production of energy while at the same time targeting consumption reduction through low-tech energy efficiency or smart building techniques. As part of the EU Island Initiatives, a community on Sifnos in Greece uses local renewable resources through shared ownership and private investors which have made the island independent of fossil fuels. Another example is the Transition town of Dyssekilde who uses a shared geothermal heating system for their houses using electricity generated by their windmill.

Community strategies and examples

The community movements in Table 1 contribute to a diverse set of alternative pathways for a sustainable and regenerative future, acknowledging the need for integrated transformation across multiple dimensions. To ensure that such actions for transformative change do not stop at one-off events but can actually be employed by communities in the long-term, different empowering community strategies are used supporting their capacity for self-governance and self-sufficiency in resources. The Global Ecovillage Network for example 'envisions a world of empowered citizens and communities, designing and implementing their own pathways to a sustainable future' (GEN Global Ecovillage Network 2018). Empowering takes place via capacity building, education and experiential learning, taking into account justice and equality, inner transformation while also supporting place-shaping practices. Each of these strategies addresses one or more dimensions described before. Furthermore most movements cover all dimensions, dealing with multiple topics simultaneously.

Capacity building

Strategies for capacity building at the community level include practices that allow communities to increase their self-sufficiency, autonomy and level of self-governance (see Table 2). For example the Transition Towns Network aims to support Transition groups and hubs to learn, grow, reflect and make informed choices about where to put their energy (McAdam 2021). This is often achieved through a focus on local (perceived) characteristics of their place and the local agency (including leadership) to govern that place. Collaborative and participatory approaches can enable communities to develop sustainable pathways for the future incorporating and providing communities with the autonomy and agency to govern their place. The case illustrates the importance of community capacity building efforts to create a sense of community spirit, social cohesion and community engagement. This helps to build trust and reciprocity between members of the communities, resulting in successful community ownership and management.

Education and experiential learning

Local communities provide a space for participants, volunteers or visitors to co-create and experiment with innovative ideas based on local needs and conditions.

Table 2 EU Islands Initiative: Ilha da Culatra

Ilha da Culatra (2022) in Portugal is an island community able to manage the development of their local energy transition. The local community partnered with the University of Algarve developing a participative process to decide on appropriate technical solutions, taking into account the specificities of the island context. Their vision is to be the first Portuguese clean island community by introducing clean and decentralised systems of water, waste and energy. The EU Island Initiative supported their ambitious plans with a two day program of workshops and discussion sessions. All related activities, including a clean-up day, contributed to a sense of citizenship and increased community participation. The community got involved with public and private actors and created a platform of knowledge exchange; debates identified ideas for viable solutions towards a clean energy transition. Strong connections were fostered among academia, companies and citizens to collectively define priorities, generate ideas for action and work towards a shared vision for the community and community-based management. As a result, the community has become more self-sufficient in water and energy supply based on desalination of water, solar farms, an energy storage system and an off-grid energy distribution.

Table 3 GEN: Sunseed Desert Technology and Ecolodges

Sunseed Desert Technology (2021) is a locally led educational project in an off-grid village in Spain in Andalucia. It was set up as a practical experiment to combat desertification and it developed into a non-formal education project for the transition towards sustainability. Nowadays, it provides a space for volunteers and visitors to experiment with healthy and ecologically responsible low-impact lifestyles. Experiential learning strategies within the community focus on production and consumption patterns, ecological preservation, local energy production and water management. This includes for example experiments with biogas, solar energy, bicycle-powered machines, organic gardens and permaculture principles. The ecological study of their place allows them to understand the local processes and experiment with methods that combat land degradation, improve soil quality, restore the local vegetation and implement innovative water management technologies. Education takes place by sharing and exchanging their knowledge, ideas, solutions and lessons learned in the form of for example tours, youth exchanges, courses or school visits. With educational courses on permaculture principles, social relations and sociocracy, the community aims to educate people about social systems that favour beneficial patterns of human behaviour.

Experiential learning and education enable communities to develop novelties and to embed these innovations in places for more enduring change. Many ecovillages support learning towards regenerative lifestyles in accordance with the local environment (GEN Global Ecovillage Network 2018; Kalouli 2021; Ulug et al. 2021; Morris 2022; Pisters 2022). Table 3 illustrates how a local ecocommunity in Spain experiments with permaculture principles, sociocracy, and low-tech solutions for water and energy management. Education within and outside of the community and within the wider GEN network contributes to the scaling of their vision and mission, impacting more people and places beyond their community.

Strategies for justice and equality

The analysed initiatives often promote inclusivity, equality, social justice and human rights, in order to create equal opportunities to access work, housing, education and health, as well as providing everyone with a political voice to speak up about these topics. Communities are engaged in communal sharing of food gardens, transport facilities, waste stations and communal areas, or promote shared ownership of renewable resources and marine protected areas. Such a sharing economy not only supports equal access to resources, but also strengthens their political voice. By collaboration with other stakeholders on higher scales, co-creation is supported from the bottom-up, promoting more inclusive decision-making processes (see Table 4).

Strategies for inner transformation

Inner transformation relates to exploring and addressing people's consciousness, values, worldviews, spirituality and human-nature connectedness to support system change towards more just, equal and sustainable futures (Woiwode et al. 2021). Addressing such issues requires a safe space, where differences and conflicts can be addressed and accepted while aiming to connect for the common good. Local initiatives and communities provide such a safe space for reflection and joint action to experiment with radical ideas that clash with existing paradigms Activities for social learning, self-reflection, emotional learning and inner transformation can be supportive towards transformative adaptations and innovations (Kunze and Avelino 2015; Dumitru et al. 2016; Pisters 2022). Local Transition initiatives for example aim for a sense of interconnectedness to one's self, others and nature, including feelings of compassion, equity and social justice. They for example promote activities which address people's well-being and health and strengthen their capacity for self-reflection and awareness (Longhurst and Pataki 2015) (see Table 5). Such activities help to create more flexible, adaptive and deliberate attitudes in favour of altruistic and biospheric values, facilitating social learning and innovation for transformative adaptation (Woiwode et al. 2021).

Sustainable place-shaping

Place-shaping refers to how local initiatives and communities develop transformative place-shaping practices,

Table 4 Doughnut Economy Action Lab: Devon

The Doughnut Economy Action Lab (DEAL) in Devon (DEAL 2021: Devon Doughnut 2021a, 2021b) is "*a platform for bottom-up science and citizen responses that demonstrates a vision and framework for meeting the needs of all people within the means of the living planet*". A group of people in Devon adopted Kate Raworth's framework of the Doughnut (Raworth 2017) and envisioned a 'safe and just space for humanity' providing a narrative for future change in the context of Devon, based on the specific characteristics of the area. By communicating a clear narrative, they aim to inspire citizens to engage with the Devon Doughnut and to set a culture for collaboration and regeneration of the future of Devon. The Devon Lab works with online sessions and workshops to gather local, social and ecological data on issues that citizens find important and useful to measure. They collectively define problems and work towards resident-defined key social challenges in the community, such as food, water, energy, waste, social equality, health and wellbeing, education and culture. The Devon Lab also aims to strengthen the civic voice and civic role in society, centring citizens at the heart of the process. In their view, a political voice should be given to the community as they have the answers for meeting social needs. This is especially relevant to people who live in really deprived areas, who are often excluded.

Table 5 The Transition Movement: Totnes and Kingston

The Transition Movement is a grassroots movement of connected transition groups, initiatives or transition hubs. Their vision is to work with '*the hands, the head and the heart*' (Beattie 2021a, b): turning visions and ideas into tangible reality by balancing (collective) intelligence with emotional, relational and social aspects. When transitioners realised the important aspect of monitoring and reflecting, they also began to prioritise self-reflection, wellbeing and personal self-care. The movement provides guides for inner transition at a personal level (resources for personal resilience) and at the group level (conflict resilience resources). Transition towns in Totnes and Kingston (Transition Town Totnes n.d.; Transition Town Kingston n.d.) for example apply this directly in practice via mentoring and wellbeing groups, community mediation and mindfulness classes, transition support groups or so called 'Happy Cafés'. This provides a space for like-minded individuals to meet. By developing practices such as Food Festivals, social drinks, share and repair cafés and community gardening, they aim to improve people's emotional wellbeing and their interconnectedness with one's self, others and the natural world. This allows people to move away from their individualistic consumer identities and behaviour, towards a way of living in line with the needs of themselves, others and the natural world.

including ecological and technological changes and a shift in institutional rules (Horlings et al. 2021). Transformative place-shaping practices by local communities involve processes of socio-cultural re-appreciation, ecological re-grounding, and political-economic re-positioning of places (Horlings et al. 2020a, b). Examples of transformative place-shaping practices include the shared ownership and management of renewable resources such as solar and wind farms, the promotion of locally grown food in urban gardens or the application of energy efficiency in the physical environment via smart buildings and transport electrification. Table 6 shows how communities are involved in place-based policy arrangements such as marine protected areas (MPA) to safeguard marine and coastal ecological processes and the livelihoods of fishing and tourism that depend on these resources.

Discussion

The results described show the varied ways networked initiatives and movements respond to climate change and sustainability challenges. We will interpret here the results along the lines of our analytical framework described in the "Analytical framework" section.

Dimensions of transformation

We found that most of the initiatives and movements integrate different dimensions of transformation, though they might prioritize some of these. The dimensions discussed include a variety of practices such as environmental protection, rethinking production and consumption patterns, reducing waste and the use of renewable resources. Though attention is paid to the governance dimension as well, spending energy, time on influencing policies is a dilemma, especially because policies are often seen as slow and not supporting. A knowledge gap still exists in how governance can support citizen initiatives, combining national climate and sustainability goals with more decentralised place-based policies in different contexts (Wu 2021). Also, more insight is needed how stagnations can be 'unlocked' through different regional and multi-scalar governance arrangements to build momentum towards 'systemic' transformative change (Granberg et al. 2019).

Strategies

While *capacity building* turned out to be an important strategy as acknowledged in the literature, this strategy also provides an important condition for other strategies, Capacities for the implementation of agro-ecological, energy and water solutions can be developed in the context of *learning and experiental* strategies. Learning includes the development of alternative economic models including attention for *social justice and equality* (Pellicer-Sifres 2020; Turner et al. 2021). In order to get involved in decision-making and climate governance, communities need a voice, providing them with the capacity to develop just, equal and inclusive responses to

Table 6 Global WWF Initiative: Ocean Witness

Ocean Witness 2019, 2021) is a platform for coastal communities to share personal stories and solutions for protecting the coastlines and the associated livelihoods. Many coastal communities are familiar with problems related to overfishing, illegal fishing, mass tourism and ecological degradation, causing challenges for the livelihoods of people dependent on the coast. These coastal communities consider themselves as traditional 'custodians' or 'witnesses' of the oceans, having the appropriate traditional and indigenous knowledge to work towards a sustainable management of coastal ecosystems. This is also the case for the coastal communities in Conil de la Frontera (Spain) and Armacão de Pêra (Portugal) where there is a need to re-balance economy and ecology, fishing and sea life or tourism are important the economic pillars of these coastal communities, but depend on sustainable maintenance of the sea and beach. Based on a strong community interest and sense of place, owners of the port of Concil started to implement a coastal MPA to combat illegal fishing and developed their local fishing label 'Fish de Concil'. In Armacão de Pêra, a bottom-up process led to a collaboration with the council, the city hall and the University of Algarve to work on a MPA along the southern coast of the Algarve. These MPA's will promote nature conservancy and contribute to a healthy and productive ocean, as well as a sustainable future for these coastal communities.

climate change (Hölscher 2020a, b; Ziervogel et al. 2021). Capacity building also supports positive tipping points, which allow the fast deployment of evolutionary-like transformative solutions to tackle the present socio-climate quandary (Tàbara et al. 2018). *Inner transformation* takes place by creating awareness and learning processes, changing values and mindsets which can result in a change in practices (Pisters 2022). Key for (networked) communities is the capacity to align different motives and ideas into a mobilising and shared narrative to frame climate issues. Narratives reframe current world views and communicate radical ideas for novelty creation and embed these ideas into existing or new cultures and practices (Lenz and Shier 2021; Westley et al. 2013). Narratives can thus support an 'inner transformation' of embodied community members engaged in places with their head, heart, hand and feet (Horlings et al. 2020b). Narratives help to establish collective identities that are fundamental for social change and /or transformation (Lenz and Shier 2021; Ulug et al. 2021). A shared collective identity together with a shared narrative helps to orient actors towards their shared ideals (Quick 2017). It helps to build and support collective leadership in various ways.

Scaling

Overall, as the analysed movements are already networked on a European or global level, they contribute to the *scaling-out* of local transformative innovations from communities. As they point out themselves; their aim is to accelerate community-led development. *Scaling up* to the institutional level is important to strengthen the local communities' voice in local decision making, thereby attempting to make the necessary shifts in policy to ensure more social justice and equality. Education and experimental strategies are relevant for *scaling-deep*—referring to amplification processes within the initiative—as well as for scaling out, to change mainstream practices and debates beyond the level of niche-innovations. Place-shaping shows real-life examples which can potentially be scaled out and up, dependent on local characteristics and place-based policies. We found little information about *scaling within* so far, though the literature on eco-villages indicates that the stabilisation of such communities can be a real struggle by a continuous in- and outflux of (temporary) inhabitants (Morris 2022). Processes of scaling deserve more scholarly attention, addressing the dilemma how to develop place-based solutions, rooted in the material and immaterial capacities of 'resourceful' communities (Franklin 2018) while also aiming to have a transformative impact beyond communities on larger geographical scales.

Leadership

Leadership ties transformations and scaling together. Collective community leadership works as a social bricoleur with a focus on the community's needs for which a strong network and a collaborative structure is needed to realize their aims. Collective community leadership can support scaling-out processes involving the general population, gaining more publicity and gradually influencing policy structures. Though individual leadership is important, more often collective, shared or distributed forms of leadership are emphasised in the contexts of initiating collective action and movements. Key roles of such leadership identified so far are firstly the strategic alignment of multiple actors and networks (Hambleton 2015a, b; Keys et al. 2016; Lenz and Shier 2021; Strasser et al. 2019). Facilitators couple the collective's purpose with larger groups of people involved in the collective, contributing to orchestrating capacities. This means deliberating and navigating the co-creation process of collective learning and collective framing with multiple disciplines to articulate narratives that reflect local conditions (Knuth 2019). Secondly, a visionary role is key to identify and articulate the collective's purpose, communicating and developing this into narratives. Intermediaries with potential capacities can help to explore alternatives and provide an unlocking capacity here (Knuth 2019; Lenz and Shier 2021; Ziervogel et al. 2021). Thirdly, leaders can function as change agents providing bottom-up vitality and empowerment, taking the lead in place-shaping on a local and regional scale (Knuth 2019; Sotarauta and Suvinen 2019). Strategic conversations at higher levels are needed to consolidate and bring together the necessary elements to influence policy. This means that political capacities (participating, networking, advocacy, lobbying, coalition building) are relevant for leaders to build strategic relationships and to set up conversations with high-level policy-makers about local innovations (Lam et al. 2020a, b; Westley et al. 2013). Together these roles can support transformative capacity and co-create change at the community level while leadership also can connect different scales and sectors. However, we would argue that more empirical research on leadership in networked movements and within society in general is needed (see also Ziervogel et al. 2021) on not just what leaders do but also why and with whom.

Conclusions

This article has discussed transformative community responses to climate change and sustainability problems, based on a literature search of academic articles as well as grey literature on networked community initiatives,

movements and cases, available online. We will briefly answer here the three research questions.

With regard to the question on transformative responses we have shown that communities and movements develop varied strategies: capacity building, education and learning, inner transformation, incorporating social justice and equality and sustainable place-shaping, combining multiple dimensions of transformation. This doesn't necessarily mean that practices and strategies necessarily have a transformative impact, but more that transformation as a process starts with community awareness and learning, changing values and behaviour (scaling-deep) which has a 'ripple' effect gradually influencing others in wider circles and networks.

A variety of scaling strategies are employed to increase their societal impact. As the analysed movements are already networked on a national, European or global scale, they contribute to the scaling-out of local transformative innovations from communities to other places, aiming to accelerate community-led development while taking place-based characteristics into account. Scaling up to make the necessary institutional shifts in policies still faces considerable obstacles in different institutional contexts such as a lack of political will and leadership, institutional fragmentation and political agendas that focus more on incremental adaptation than transformation.

With regard to leadership, these initiatives show collective leadership, being frontrunners, in their responses to climate change and sustainability changes. Leadership supports to scaling strategies, connecting different scale, sectors, domains and fields (Horlings et al. 2017) Though individual leadership is important, more often collective, shared or distributed forms of leadership play a role when initiating collective action and movements. Key roles of such leadership identified so far are firstly the strategic alignment of multiple actors and networks, secondly a visionary role to identify and articulate the collective's purpose, communicating and developing this into narratives. Thirdly leaders can function as change agents providing bottom-up vitality and empowerment, taking the lead in place-shaping on different scales. Together, these roles can support transformative capacity and co-create change at the community level while leadership also can connect different scales and sectors. However, we would argue that more empirical research on leadership in networked movements and within society in general is needed to retrieve in-depth knowledge on not just what leaders do but also why and with whom.

A clear political agenda and an enabling and inclusive governance, including attention for social justice and equality will become more relevant as the rising costs of climate measures will mostly affect those who are already vulnerable to climate risks. Not just the empowering and facilitation of communities and a shift of agency towards them is needed as scholars have argued, but also institutional learning to support processes of co-creation between public, private and civic actors within different sectors and on multiple levels and scales.

While this research only provides a first step exploring the transformative potential of community initiatives, empirical research on the ground is needed to further explore not just their practices, but also the personal and political dimension of such transformations.

Supplementary Information

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Additional file 1: Table 1. Key words for literature search. **Table 2.** Overview of strategies and dimensions.

Authors' contributions

The first author has carried out the literature review. Both authors have fully contributed to the writing and editing of the article. The author(s) read and approved the final manuscript.

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Declarations

Competing interests

Both authors declare that they have no competing interests.

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