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Exploring the transformative capacity of place-shaping practices

Lummina G. Horlings¹ · Dirk Roep² · Erik Mathijs³ · Terry Marsden⁴

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Abstract

The eight papers in this Special Feature result from the EU funded SUSPLACE collaborative programme that aimed to explore the transformative capacity of sustainable place-shaping practices, and if and how these practices can support a sustainable, place-based development. The programme encompassed 15 research projects investigating a wide range of place-shaping practices embedded in specific settings. From a common framework on sustainable place shaping, each research project has developed its own theoretical and methodological approach. This editorial explains the overall approach to sustainable place-based development and more specifically the three analytical dimensions of transformative practices, that together propell sustainable place-shaping: *re-appreciation*, *re-grounding* and *re-positioning*. After an overview of the eight articles, the contribution to sustainability sciences is discussed. The research programme has provided insight into the transformative agency of practitioners and policymakers engaged in shaping sustainable places, as well as the transformative role of researchers.

Keywords Sustainable place-shaping · Transformative capacity · Sustainability sciences · Place-based development

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Introduction

Place-shaping occurs in a context of a world-wide, encompassing web of relations, interrelated ordering processes and interconnected practices that enable a global flow of goods, capital, knowledge, ideas, humans, etc. from place to another place (Castells 2009). Globalization as a historic process entails the restructuring or transformation of place-shaping practices and the relations they are embedded, which has been dominated by a capitalist logic irrespective of the specificity and carrying capacity of places. This has caused many of the unsustainabilities we are facing today: unequal development, exclusion of people and social injustice, poverty, economic decline, resource depletion, degeneration of ecosystems, ecological hazards and food insecurity. Often notions of place and space are not sufficiently incorporated in debates on sustainability, resulting in place-less approaches to sustainability. A ‘place-less’ approach is not sensitive to differences in contexts and places and the relations between places. A place-based approach, on the contrary, acknowledges the activities, energies and imaginations of the people and communities and how these can have impact on the environment and economy in a more sustainable way (Marsden 2013). Shaping sustainable, resilient or

even regenerative places requires the transformation of the relations actual place-shaping practices are embedded, and the active and deliberate building of transformative capacities to do so (Horlings 2019).

The eight papers in this Special Feature result from the SUSPLACE programme that aimed to explore the transformative capacities of place-shaping practices, and if and how these practices can support a sustainable, place-based development. The programme was based on the assumption that people and places are not powerless victims but are able to express transformative agency in shaping their place to their values, ideas and interests (Roep et al. 2015). This, however, raises questions as what motivates people to transform (needs), what should be changed or transformed (challenges), how to transform (through innovations) and through which practices transformation can be achieved (Mehmood et al. 2019).

The next section first provides some basic information on the SUSPLACE programme. In the subsequent three sections the founding approach is explained: first why place matters, second the urgent need for a place-based approach to sustainable development, and third the introduction of the sustainable place-shaping framework to position the approach taken in the sustainability transformations debate. Here the key dimensions of transformative practices, that together propel sustainable place-shaping, are framed as intertwining processes of *re-appreciation*, *re-grounding* and *re-positioning*. Section six introduces the eight articles of the Special Feature.

SUSPLACE: the sustainable place-shaping programme

SUSPLACE (<https://www.sustainableplaceshaping.net>) is a Marie Skłodowska-Curie Actions programme funded by the European Commission. The overall objective of the programme was to explore the transformative capacity of place-shaping practices enhancing sustainable development. Research was carried out in 15 individual research projects by 15 Early Stage Researchers (fellows) appointed at research institutes across six EU countries under the supervision of academic staff. The individual research projects were embedded in a collaborative Research, Training and Networking programme that, next to the supervision and capacity building of each individual fellow, provided space for joint learning and reflexivity and collaborative work. This resulted in an overall theoretical and methodological approach to place-based sustainable development and joint outputs. Besides articles in scientific journals, a toolkit on arts-based methods for transformative engagement (Pearson et al. 2018) and a guide for policy-makers and practitioners to place-based working and co-production (Quinn and De

Vrieze 2019) have been published. The 15 research projects cover a wide range of place-shaping practices embedded in specific settings, exploring pathways to place-based sustainable development. The research has provided insight in the capacity of engaged practitioners and policymakers in shaping sustainable places, as well as the role of researchers. The SUSPLACE Synthesis report (Horlings 2019) provides an overview of the approach, the projects and output and impact.

Place matters

Places change at a rapid pace and are affected by generic ordering processes such as globalization, and modernization. These processes are often pictured as hegemonic, all determining processes, decreasing or even disregarding the relevance of place: “There is an overwhelming tendency both in academic and political literature, and other forms of discourse, and in political practice to imagine the local as the product of the global, but to neglect the counterpart to this: the local construction of the global” (Massey 2005). Some scholars argue that globalization has turned the world into a marketplace, where everything has become a tradable object, driven by a discourse of competitiveness (Bristow 2005). Others argue that the re-ordering caused by globalization has resulted in a disconnection between places of production and consumption (Wiskerke 2009), sustainability problems, and the commodification of land and landscapes (Van der Ploeg 2010). Some scholars have even referred to the ‘erasure of place’ (Escobar 2001), ‘non-places’ (Relph 1976), or ‘placelessness’ (Auge 1995) as gloomy outcomes of globalization. Meanwhile, institutions which shape our society such as the national state have eroded in the past decades, handing over tasks to market parties and citizens. Society has become liquid as Bauman (2012) argues, power is exercised on a global scale, institutions have become fluid, and the ways we live together is also subject to change. The identity of people and places has become fluid as well. This raises the question: does place still matter?

We would argue that place is more relevant than ever. A key argument is that all structural processes affecting places, such as capitalism, climate change, state decisions, or market relations, have a differentiating impact on how places are actually shaped. This results in place diversity and spatially dispersed sustainability problems, such as resource depletion, economic inequalities, mobilities and social exclusion. Exogenous factors are not merely adopted in a local context, but result in spatially varied outcomes: ‘territories of difference’ (Escobar 2008). These outcomes are strengthened by responses to globalization, as alternatives to the dominant concept of modernization as Escobar argues: “Even if we emphasize the emplacement of all cultural practices as a result of global generic forces we have to consider (global

capitalism as a cultural practice which varies between places” (Escobar 2001, p. 43).

Furthermore, a place is not a blank canvas, but the result of the inscription of culture, physical characteristics, and historic and actual human actions, creating inequalities and spatial differentiating. Places are also unequal in the ways power, capacities and resources can be mobilized, something that a local ‘politics of place’ must take into account (Massey 2004). Places shape a wide range of opportunities and barriers. The physical shape of places, their infrastructure, ownership and uses, all influence how people can make a living and live their lives and enable or disable future pathways.

Place is also relevant because it has meaning for people. It holds the space for individual values and collective identities of people (Horlings 2015a, b). A shared sense of place can potentially be a call for action and result in collective care and responsibility of resources (Grenni et al. 2019, this issue) although the link between sense of place and action is not a straightforward and causal relation (Soini et al. 2012).

Place is also an arena, an expression of power relations, holding a variety of opinions and interests and potential conflicts, cutting across boundaries of wealth and institutions. It is a bridging notion that helps to understand how humans, as social beings, interact with their environment. Place is also a setting for collective action and co-creation, the object of policies that aim to intervene in relations shaping places resulting in new connectivities (Horlings 2018). The human actors in places should not be considered as passive victims of hegemonic processes affecting their place (Long 2001; Tsing 2000). Humans employ individual and collective agency in their everyday practices and co-shape their place of living. By negotiating their engagement in global ordering processes, human actors can alter the web of relations and interconnected practices which they are part of. Understanding these relations requires “paying attention to the agency of local actors, whilst also examining the broader economic and social relations—both historical and contemporary—which locate places within wider networks” (Healey and Jones 2012, p. 212). Human agency is not merely a defensive or reactionary force against global restructuring forces, but a way of re-negotiating the conditions of engagement in these processes; this agency re-assembles places, expressed in grounded practices.

A place-based approach to sustainable development and transformation

There is an urgency for transformations and new (spatial) development trajectories in the context of our unsustainable patterns of living, production and consumption, provoked by the processes of globalization, and uneven development. Loss of biodiversity, the depletion of resources and climate change are just some of the consequences. The challenge

to develop sustainable pathways for the future has become especially urgent in the wider debates on the depletion of fossil resources and climate change. The simple evidence of a global ambient temperature rise is indisputable. Climate change affects places in different ways (IPCC 2018), resulting in non-linear, complex and partly unpredictable changes, or even a societal collapse as some argue (Bendell 2018). The concept of sustainable development was born from the need to preserve the quality of natural resources for present and future generations. It is commonly perceived as a ‘balancing act’ between planet, people and profit. Embodied in international policy agendas starting from the 1972 Stockholm Conference, the best-known formal definition of the concept is contained in the so-called Brundtland Report ‘Our Common Future’, published some decades ago (WCED 1987). However, in the Brundtland Report the connections between sustainability and notions of space and place remain implicit and underestimated.

Sustainability has been interpreted in different ways (see also Horlings 2019; Horlings et al. 2019), most often from a systems perspective. A systems perspective acknowledges the different dimensions or ‘pillars’ of sustainability (people, profit, planet) and the complexity of interconnections between geographical scales and levels of change. Interpreting sustainability in terms of ecological limits respects the ecological boundaries in all human activities and aims at shaping practices that fit within those planetary boundaries (Rockström et al. 2009; Raworth 2017). In other words, the goal is to ensure that no one falls short on life’s essentials (from food and housing to healthcare and political voice) while ensuring that collectively we do not overshoot our pressure on Earth’s life-supporting systems, on which we fundamentally depend—such as a stable climate, fertile soils, and a protective ozone layer.

Sustainability can, however, also be interpreted as dynamic, political, and deliberately constructed by human actors. This position understands sustainability as negotiated between stakeholders in places. Ideas, wishes, demands and opinions differ between actors involved and these different viewpoints should be respected, while also bringing the implicit normative and political intentions to the surface. Place-shaping initiatives can sustain but also question these intentions.

Regenerative development aims to go ‘beyond’ sustainability, which is conceived as maintaining the status quo, exploring more balanced relations between society and ecosystems in which we see “ourselves as part of a co-evolutionary whole, living in symbiotic relationship with the living places we inhabit” (Mang and Haggard 2016, p. xiv). Drawing from ecology and originating in the design field, the approach to regenerative development and design entails a radical shift in mindset among all inhabitants of a place. The assumption is that the crises which affect our world, create

the urgency to actively restore or repair—not just sustain—the social, economic and environmental damage done to the planet. Arguably, efficiency and ‘mere sustainability’ are no longer enough, and humans need to regenerate the health of places and support the co-evolution of human and natural systems in a partnered relationship. Used in an interdisciplinary perspective there is a wide consensus that regenerative practices are born from the uniqueness of a place. Regenerative action initiates transformation and highlights the need to constantly re-evaluate and adapt to new conditions—an aspect particularly important in the face of rapidly changing climate conditions.

Transformations are rooted in and affect places. Sustainable transformation must accommodate the heterogeneity and diversity of places, thereby supporting place-based approaches to development. Such place-based approaches are increasingly favoured in policy and science (Barca 2009; Barca et al. 2012; Heley and Jones 2012; Roep et al. 2015; Tomaney 2010; Woods 2011). Although sustainability transformation needs to be rooted in real spaces and time frames, the significance of space and place is not always acknowledged. These debates are often locked in disciplinary discourses, including different ontological and epistemological assumptions and viewpoints, while a more integral interdisciplinary approach is needed to tackle the sustainability challenges of our time.

The ability to adapt effectively to the current sustainability challenges asks for an inherently interdisciplinary ‘place-based’ approach, building on the specific resources, assets, capacities and distinctiveness of places, which can strengthen the resilience of areas (Barca 2009; Barca et al. 2012). Hence, we need concepts and models of sustainable place-shaping based on the energy and imagination of people as well as the ecology and materiality of places (Marsden et al. 2010). A place-based approach to sustainable development can provide a more systematic understanding of the place-specific connectivity between social-cultural, political-economic and ecological processes that enable or hinder transformations towards sustainable places (Marsden 2012). A place-based approach can also accommodate public participation and negotiation, local knowledge and sense-making, practices and planning to support sustainable development (Horlings 2018). Place-based research can help to understand and explore the transformative capacity of grassroots practices. Like sustainability, transformation as a concept has been interpreted in different ways as well. Building on different strands of literature we consider transformation as the fundamental alteration of a social-ecological system once the current conditions become untenable or undesirable and hence contested (Gunderson et al. 2005; Folke et al. 2005) requiring transformative agency (Westly et al. 2013). This is a radical, bottom-up perspective of cross-sectional change, which includes the personal, practical and political

sphere, acknowledging that human activities have to stay within the planetary boundaries (Rockström et al. 2009) while changing the relations between humans and their environment. Conditional for these transformations to occur is a ‘deep adaptation’ to uncertainty and change, including the emotional and psychological attitudes needed to change awareness and behaviour (Bendell 2018; Hoggett 2019).

Sustainable place-shaping: a conceptual framework

Notions such as place, territory and region have been amply debated in the literature. Researchers have discussed in-depth what a place is and have used a variety of definitions and understandings. Our position here is that places can be considered as socially constructed, while also emphasizing the relevance of path dependency, structuring processes, and physical characteristics in place-shaping processes, resulting in dynamic material as well as immaterial place characteristics (see e.g. Roep et al. 2015; Horlings 2016). While some scholars emphasized the relevance of administrative or governmentally bounded areas, relationally oriented scholars point to the importance of actors, relations, processes, networks and connectivity. Notions such as place as entanglement (Ingold 2008), assemblage of actors (Woods 2015), ‘thrown togetherness’ (Massey 2005), or place-making (Pierce et al. 2010) express a relational perspective on place, pointing to the relevance of connectivity via social relations stretching beyond administrative boundaries. A relational approach to place has been foundational to the SUSPLACE research programme. This means that places are considered as assemblages, resulting from intermingling ordering processes stretching in an time–space continuum that has no a priori boundaries. Although places do have some endurance, they are dynamic, continuously changing because of economic, institutional and cultural transformation. Places do not have a pre-given identity but are the outcome of flows and relations. The nature of a place is not just a matter of its internal (perceived) features, but a product of its connectivity with other places. Places are nodes in networks, integrating the global and the local. A relational notion of place addresses the temporal, spatial and multi-scale interlinkages of concrete issues in places. From a relational perspective places are nodes in a web of unbound relations as well as temporal and spatial expression of place-shaping practices embedded in these relations.

The (perceived) identity of a place is continuously changing; a place is always under construction, never finished, never closed. Therefore, we speak of processes of place-shaping. Places are connected and co-evolve, continuously reshaped via processes of change. This approach emphasizes the linkages between geographical scales. Processes which happen on a global and national scale, such as climate change, migration, or the economic and political

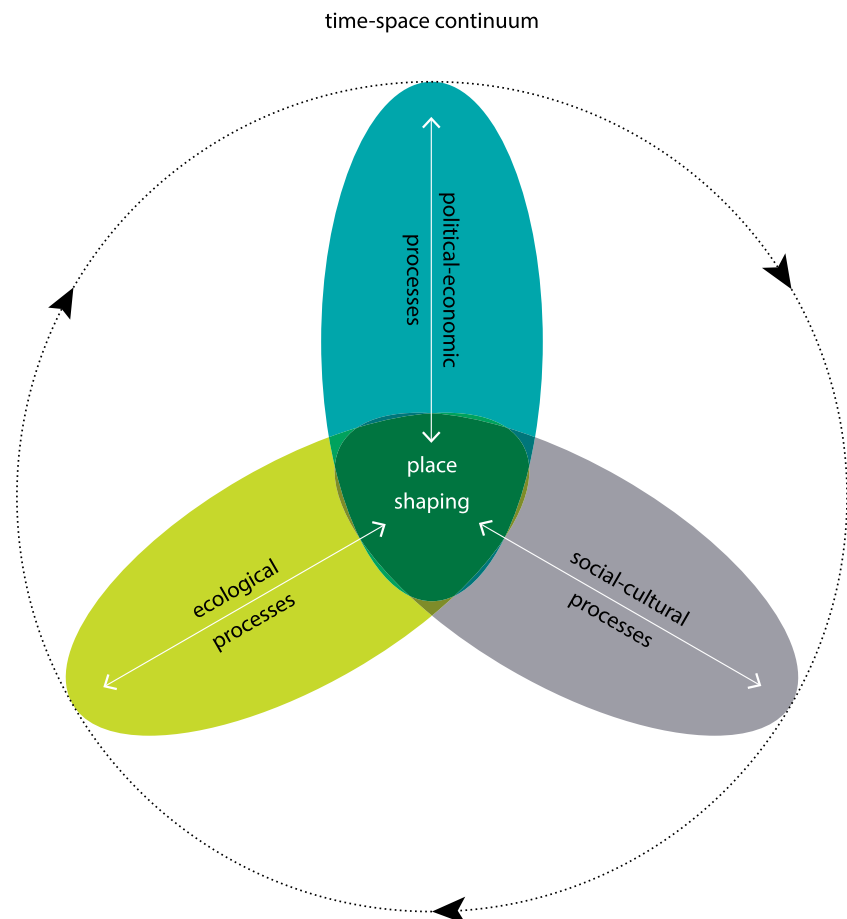
situation, have local impact. However, the local practices of people can influence higher scale developments: “As the specificity of place is understood as generated relationally, then there no simple divide between inside and outside, between local and global, between local struggles and wider movements” (Massey 2004). The relations that shape places are (re)produced by socially, culturally, politically and economically interconnected interactions between humans, their institutions and socio-ecological systems.

Sustainable place shaping refers to the capacity to re-embed daily lived practices in social-ecological systems in a more sustainable way, thus altering the relations between people and their environment. Processes of sustainable place-shaping thus ‘reconnect people to place’ (Horlings 2016). From an actor perspective (Long 2001), it considers three sets of unbound, in time and space differentiating structuring processes that ‘propel’ everyday living: socio-cultural, political-economic and ecological processes (see Fig. 1). These processes, however, also provide the space for human actors to position themselves and perform place-shaping practices. These practices create connections between nature and society, the local and the global, the rural and the urban (Woods 2011).

Place shaping emphasizes how humans engage themselves with their place of living, connect themselves to the place-specific socio-cultural and bio-physical surroundings and embed their every-day practices to foster resilient social-ecological systems and make their living more place-based and sustainable (Roep et al. 2015). The assumption is that sustainable place-shaping practices potentially embody a transformative capacity and the capability to enforce change; they re-assemble the web of relations that shape places. Collaboration, collective capacity-building and self-efficacy are key conditions to utilize the full potential of places and communities towards place-based sustainable development.

Sustainable place-shaping implies the construction of new narratives, novel practices, alternative paradigms, the rise of civic movements, the emergence of new collectives and arrangements, and co-creation of knowledge. Examples of deliberate sustainable place-shaping practices studied in SUSPLACE are the commoning of natural resources, promotion of place-based food or crafts, community-owned renewable energy generation, the provisioning of ecosystem services, but also place-based policy arrangements. Sustainable place-shaping is contextualized, situated in specific time–space frames, open to new possibilities and imaginaries and requires not just a change of policies and

Fig. 1 Processes that determine place-shaping. Adapted from Roep et al. (2015)



practices but also a shift in people’s awareness, values and attitudes. Such transformative agency cannot be planned and imposed but results from the ways in which humans share and shape their place of living. Investigating and exploring the transformative capacity of sustainable place-shaping practices can reveal how unsustainability can be addressed and overcome, providing the ground for place-based sustainable development.

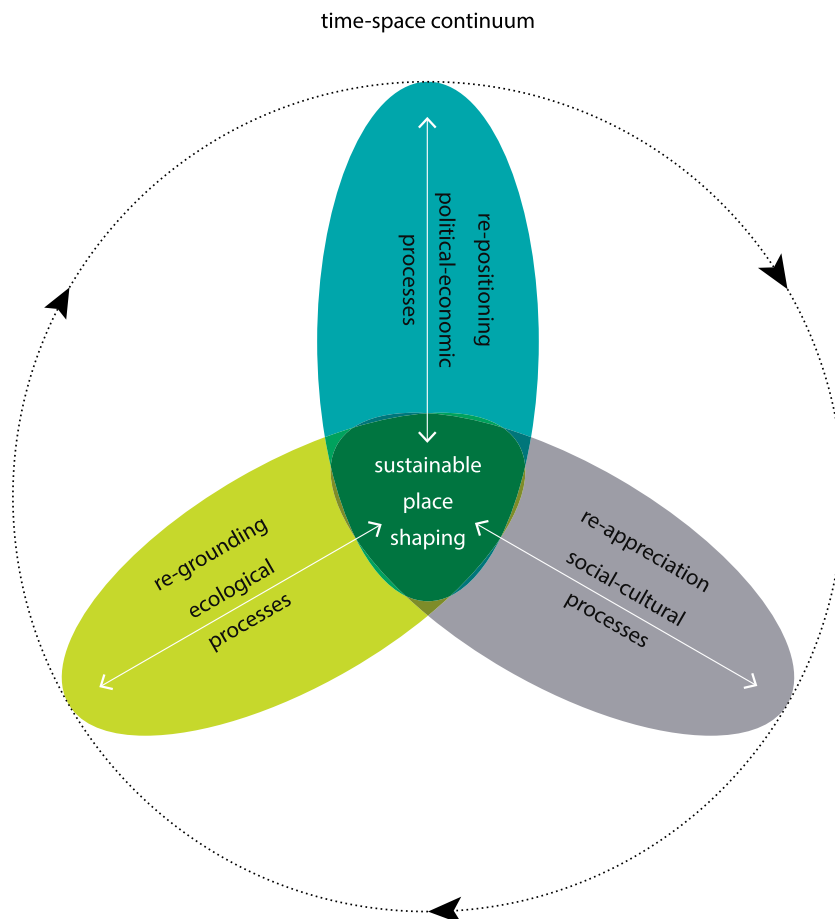
The sustainable place-shaping conceptual framework (see Fig. 2) derived from the general framework presented above has been foundational to the SUSPLACE programme and each of the 15 research projects (Roep et al. 2015; Horlings 2016, 2019). The graph shows how sustainable place-shaping results from the deliberate intervention in socio-cultural, political-economic and ecological ordering processes. The framework shows how the transformative capacity of place-shaping practices can be explored along with three, mutually enforcing dimensions:

- *Re-appreciation*. People attach meanings and values to place and reflect on the relations which they are part of. Processes of re-appreciation can strengthen people’s sense of place, which is an umbrella term for the connections and values people hold about their place. Sense

of place provides information about which place qualities people consider as worthwhile and what should be preserved. Researchers and practitioners can analyse these meanings to place as Grenni et al. (2019, this issue) argue. Re-appreciation is the starting point of awareness of place identity, which can result in a ‘proud of place’ and a joint mobilization around new storylines and agenda’s for the future (Grenni et al. 2019).

- *Re-grounding*. A re-grounding of practices in place-specific assets and resources, can potentially make them more sustainable. Practices of sustainable place-shaping are influenced by wider communities, cultural notions, values, natural assets, technology and historical patterns, illustrating existing variations in institutional and cultural contexts. The challenge of re-grounding is to develop products and innovation based on assets, traditions and place characteristics involving inhabitants and stakeholders. Research can show how actors reflect on and negotiate the conditions of engagement in global processes, developing innovations that support their autonomy and self-efficacy in the daily sphere, contributing to place-based development (Vasta et al. 2019).
- *Re-positioning*. The re-positioning towards the established institutions, or dominant regime such as govern-

Fig. 2 Shaping sustainable places. Adapted from Roep et al. (2015)



ment and public policies, business and markets and the innovation system evolves by creating experimental spaces or niches. Re-positioning includes a critical perspective on how our economic system is organized and what might be sustainable alternatives that shape places can enhance the quality of life in places. This includes the acknowledgement of ‘diverse economies’ (Gibson-Graham 2008; Gibson-Graham et al. 2013), beyond the current capitalistic way of organizing markets, which can change current economic relations. Examples are social entrepreneurship, social services, new currencies, and alternative products. Key questions here are whether these practices can be considered as sustainable innovations in niches, and under which conditions these can be up-scaled. Re-positioning changes the relations between change initiators and institutions resulting in new place-based agreements (Soares da Silva et al. 2018).

The deliberate interventions are an expression of how transformative capacity is built, how the relations practices are embedded in, are intentionally transformed, and how space for sustainable place shaping is created. This framework can serve as a heuristic and analytical tool to explore the transformative capacity of place-shaping practices, as has been done in various ways in the eight contributions assembling this Special Feature.

Exploring the transformative capacity of place-shaping practices: contributions to the Special Feature

Although the contributions in this Special Feature have a common foundation, the actual research has been informed and enriched by a wide variety in theoretical and methodological approaches. We distinguish five ways how places are framed and investigated in the respective eight articles.

Place as (virtual) arena. Place is an arena with multiple stakeholders and a site for policy interventions. Place understood as arena sheds light on how social relations shape behavior, practices, and changes in organizations, society, governance, and political-economic systems. This raises questions such as which actors are or should be involved in place-shaping, how to support interaction, restore connections, and build capacities in places to enhance transformation. Soares da Silva and Horlings (2019, this issue) illustrate how sustainable place-shaping can be viewed as co-production in an arena of actors. The production of renewable energy via a new Wind park in the Netherlands is discussed to analyze the conditions form this co-production.

A place does not have to be a physical space, it can also be virtual. Husain et al. (2020) show how virtual spaces can be shaped by blockchain technologies, supporting peer-to-peer communication and exchange between businesses,

citizens, and governments outside the existing governance realm.

Place as state of mind. In recent years, the debate on sustainability, and particularly on sustainability transformation, has started to recognize the central importance of the ‘inner dimension’ in achieving sustainable futures, rooted in people’s mindsets, values and motivations. People’s mindsets influence their attitude, motivation and behaviour towards sustainability. Transformation to sustainability requires ‘change from inside-out’, which entails a shift in mindsets, engaging with emotions and changing cultural narratives and worldviews (O’Brien 2013). SUSPLACE showed how arts-based approaches and techniques can open spaces of possibility in people’s imagination, thereby evoking such a shift in mindsets (Pearson et al. 2018).

Pisters et al. (2020) explore the dimension of consciousness in sustainability transformations and how this shapes sustainability and place-shaping. Learning to embody place can potentially result in a stronger connection with a community or the environment and to a shift in consciousness so that people become more aware of the impact of their actions. Connecting and feeling compassion to oneself and others and creativity in performing tangible actions are key themes here.

Place as narrative, place as imagined. Place can also be interpreted as a socially constructed narrative. A narrative can be understood in two ways. It is a means to make sense of the world, so a way of knowing, but it is also a practice, a way of doing, using language to build new knowledge via storytelling (Bruner 1986). Places are produced and reproduced by telling stories. A shared sense of place can potentially result in new joint narratives supporting participatory planning and place branding. Grenni et al. (2019, this issue) explore the role of sense of place and place values in the context of sustainable place-shaping and propose a framework to operationalize these in research. Rebelo et al. (2019) analyze how co-development of collective agency via narratives, values and identities can be articulated for creating and promoting a more inclusive representation of place in a (hypothetical) branding exercise.

Place as stage for transformative learning. The engagement of actors in places, building transformative capacities can be viewed from the perspective of transformative learning (Pisters et al. 2020). Conditional for these capacities are enabling resources which refers to the wide array of assets, both tangible and intangible, social entrepreneurs mobilize and co-create, to launch and bring forward novel initiatives in their places. Moriggi (2019) explores the array of resources that enable and constrain the development of Green Care practices, i.e., nature-based activities with a social innovation purpose. Participants in three in-depth case studies of green care provisioning in Finland were engaged in several stages of iterative learning combining

conventional and action-research methods: semi-structured interviews, participatory mapping, and a co-creation workshop. Results show how entrepreneurs in green care resort to a great variety of tangible and intangible resources. Learning is also the key focus in the article of Mehmood et al. (2019) grounded in the interdisciplinary place-based conceptualization of social innovation. The paper aims to progress a holistic conceptual framework which integrates the active processes of learning, experiencing, and regeneration to tackle the complex challenges of sustainability. Empirical examples of this agency have been captured in this article from a series of SUSPLACE research projects. In conclusion, the authors associate the interactive nature of agency studied in these projects with sustainable re-learning, re-experiencing, and re-generation processes to reshape places in a transformative way.

Taken together, the contributions in this Special Feature show that among scholars in sustainability science, there is an increasing recognition of the transformative potential of place-based research. In this research, researchers may have a wider and more creative variety of roles. These roles are determined by the researcher's engagement with the subject, and their co-production with other place-stakeholders; the inherent theoretical, normative and methodological choices made; and the researcher's ambitions in contributing to change, and ethical issues. Horlings (2019, this issue) explore the varied roles taken by the SUSPLACE research fellows. Reflecting on the roles of researchers identified by Wittmayer and Schöpke (2014), the authors illustrate how, starting from different theoretical and methodological approaches and their engagement in places and sustainable place-shaping practices, the research fellows have performed and experienced different roles. Based on their findings the frame of the 'embodied researcher' is introduced: a researcher who is engaged in place-based research with their 'brain, heart, hands and feet' integrating different roles during the research process.

In conclusion: reflecting on the contribution of SUSPLACE to sustainability science

We conclude here with some reflections about the contribution of the SUSPLACE programme to sustainability science. Sustainability science was introduced as a specific interdisciplinary and transdisciplinary research field not only to understand complex relationships between humans and nature but also to change these relations towards sustainability. This research field is continuously evolving, and it is now embedded in academia with its own publication forums and educational programmes.

There are a variety of interpretations of sustainability science, but some common elements can be highlighted

(Dedeurwaerdere 2014). Sustainability science explicitly aids social transformations by producing knowledge on changing social-ecological systems, but also by transforming knowledge itself (Wiek and Lang 2016). Methodologically this means going beyond disciplinary perspectives and indeed building substantially upon systems perspectives, by incorporating and critically blending place-shaping practices into our conceptual and empirical repertoires.

It employs inter- and transdisciplinary research practices, including participatory action research, the co-production of knowledge and the use of creative methods. But as we see in these contributions, it also needs to go beyond these employments by re-conceptualizing and empirically grounding the role of place-based social actions in framing and mobilizing sustainability. This requires a new hybrid vocabulary which transcends binaries like local–global, nature–society, structure–agency. It needs to incorporate why certain actions occur and become successful and endure; and what capacities are needed to re-generate and re-appreciate socio-ecological developments (Marsden and Farioli 2015). In this sense, as these contributions show, progressing sustainability science ushers in new grounded theories of place, as these theories indeed are 'shaped' over time. Such research contributes to social learning in projects, to collective social learning, and to learning on the wider societal level. It also, as this special issue demonstrates, involves a spatial and place-based cognition which embodies the inherent diversity and agency of place-shaping practices.

As the sustainability challenges of our time become more pressing, much greater effort is needed to build transformative systems that actively support and encourage significant change (Waddel 2016). This has consequences for knowledge production and future research needs. The results of recent scholarly work, such as work presented at the Transformation to Sustainability Conference in Dundee in 2017, show a need for a new understanding between science and knowledge, where agendas, decisions and actions are informed by more democratic and co-produced forms of knowledge in dialogue and collaboration between citizens and trans-disciplinary scientific networks.

Such research requires reflexivity and specific skills from sustainability scientists which become more relevant, to co-produce knowledge with participants in places. When researchers engage with participants in places, a richer repertoire of insights emerges and communities become prepared for seeing the existence and relevance of ways to act on their situation at hand. Principles of action-learning and elements of participatory action research (Bradbury-Huang 2015) can inform and inspire such research while also bridging the still existent academic divide between theory and practice.

As some of the fellows in SUSPLACE experienced, researching transformation while engaging in places, also

entails a personal learning process, including a deep reflection on their values and ways of life. Becoming more aware of one's values and positions can result in a more embodied engagement in place-based sustainability research. The collection of articles in this Special Feature thus argue for an inclusive approach to place-based research, and for citizen-led place-shaping projects, where researchers are involved as active participants.

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Compliance with ethical standards

Conflict of interest The authors declare no conflict of interest.

Ethics statement SUSPLACE has formulated an ethical policy for the program. The research project proposals have been approved by the hosting institutes and the ethical committee of SUSPLACE.

Informed consent All fellows have drafted a letter of consent for participants involved in the research.

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