Place as a boundary device for the sustainability sciences: concepts of place, their value in characterising sustainability problems, and their role in fostering integrative research and action

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Abstract

Sustainability science is *difficult* to conceptualise, plan and conduct, given the broad range of epistemological commitments, methodological practices, and approaches to problem-framing taken by its constituent disciplines. This special issue is based on the idea of place as a boundary *device* for the sustainability sciences, in the belief that it can foster integrative work, guide theoretical reflection, encourage methodological innovation, and inform empirical research. Here we reflect on place concepts, before developing a series of arguments on the relationship of place to sustainability science. We first emphasise that place is not solely an interpretivist or post-positivist perspective on sustainability, as it is also congenial to mechanistic or positivist ontologies. Secondly, we argue that place does not entail a retreat from theory into particularism or thick description; it is coherent with attempts to provide explanations. Thirdly, we claim that it does not imply a sedentary, parochial approach to sustainability science that neglects interactions across scale or location. Fourthly, we caution that public spheres for tackling environmental issues can act to close-down deliberation and marginalise informal knowledge, if institutions retain norms that emphasise abstract, placeless evidence. We highlight how these ideas have been cashed out in the collected papers in this special issue, in domains ranging from biofuels governance, to estuary management, to marine governance, to ecosystem stewardship, to community-led low energy transitions, and to climate change more broadly. We end by suggesting that a place-based approach to sustainability science entails a relentless focus on context. It takes the spatially patterned, heterogeneous, fluid, networked, and contextually modified form of socio-environmental processes as central points of investigation, rather than as mere modifiers of more general mechanisms.

Keywords

Risk governance, environmental policy, boundary objects, sense of place, interdisciplinarity

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1. Sustainability science: a plural and difficult field

Sustainability science is motivated by the challenge of meeting the needs of a growing but stabilising population, whilst at the same time sustaining basic planetary life support systems and substantially reducing global hunger and poverty (NRC, 1999; Clark, 2007). Its broad scope and problem-driven nature means that it draws on a wide array of disciplines, notably geography, physics, economics, ecology, political science, the environmental social sciences (Clark, 2007), and more recently the humanities (Hulme, 2011). This has yielded substantive advances in both fundamental and applied areas, yet multi-disciplinary work is famously *difficult* (Pahl-Wostl *et al.*, 2013). Widely varying epistemological commitments, methodological practices, and approaches to problem framing make integrative research programmes hard to conceptualise, plan, and implement. At the heart of these difficulties are some fundamental disputes over the objects and purposes of science. Many academic disciplines have been forever conflicted, and often "at war" (Gieryn, 2006), over whether science should be concerned with description or explanation; with uncovering causes or with capturing regularities; with the normative or the positive; and with the contingent or the universal. This special issue is based on the idea of place as a "boundary device" (c.f. Star and Griesemer, 1989) for the sustainability sciences (building on NRC, 1999), the suggestion being that it is a concept of shared interest, and sufficient flexibility, to allow plural disciplines to organise around in the absence of consensus on epistemological, methodological, and ontological matters. Moreover, we emphasise that place has potential value beyond merely playing an organising function; putting the idea to work can foster theoretical and methodological innovation in sustainability research. In this paper we seek to clarify the concept(s) of place; explore how it might inform theory, method and practice in sustainability science; and reflect on how in turn this may contribute to theorisation of place. It motivates, synthesises, and builds upon the contributions within this special issue.

2. Place and scientific enquiry

2.1. Place and the (de)construction of scientific knowledge

It may seem at first glance rather odd to suggest place as an organising concept for sustainability science. Indeed, scientific enquiry has classically been viewed as a "placeless" phenomenon (Finnegan, 2008), with covering-law accounts portraying scientific knowledge as transcendent, universal, and timeless. When science was shown to be placed, it was typically a form of deconstruction or critique (Ophir and Shapin, 1991), *e.g. your knowledge is not quite as transcendent as you claim it to be; see how the manner in which it was produced and evaluated was shaped by social relations, cultural contexts, and institutional interests.* This (caricature of) deconstruction typically focusses on how various dimensions of context – history, politics, institutions – shape the construction of scientific knowledge, and on the often labour intensive social and material activities (*e.g.* standardisation, experimental design) required to make facts travel across time and space (Latour, 1993; Law and Mol, 2001). Our focus, however, is more on how scientists go about creating knowledge *about* places, *i.e.* where place is an *object* of scientific study, rather than some orthogonal influence that impinges on the development of universal knowledge.

2.2. Place as an object of scientific study

Why focus on places in sustainability science? For example, is it not simply a brute fact that many of the major ecological threats that the world faces – from climate change to biodiversity losses – are driven by processes that operate at global-scales (*e.g.* planetary heat balance; market processes), causal mechanisms that are relatively invariant across space (*e.g.* between population and environmental impact), and involve entities that have universal, fixed properties (*e.g.* the radiative properties of greenhouse gases) (see Hulme, 2010 and Jasanoff, 2010, for critical analyses of such global framings)? And is globalisation not acting to homogenise the social, cultural, and economic drivers of sustainability problems across space, rendering place "phantasmagoric" (Giddens, 2013)? On this reading, a focus on place may seem fundamentally misconceived or even defeatist: a retreat into the safety blanket of parochial case studies in the face of global scale risks. Yet recent years have seen a renaissance of interest in place across a range of academic disciplines concerned with sustainability, and, crucially, across researchers working at scales spanning the macro to the micro (*e.g.* Hulme, 2008; Adger *et al.*, 2011; Lambin *et al.*, 2001; for an influential early statement on the importance of place, see NRC, 1999). Place, it seems, is gaining increasing analytic purchase in our modern globalised world, and not just within research traditions that adopt a localist perspective. Later we clarify and develop various conceptualisations of place in an attempt to account for this apparent puzzle, but first we distinguish between macro and micro scale approaches to sustainability science.

2.3. Localist vs. macro schools of sustainability science: shared objects of concern, and important divisions

For analytic convenience, we distinguish two broad research traditions in sustainability science: a macro scale approach that analyses processes at a relatively aggregated level, and a localist tradition often (self) described as "place-based." The former focuses on relations between relatively abstract categories such as population, technology, and environmental impacts (*e.g.* IPAT, Dietz and Rosa, 1997; planetary boundaries, Rockström *et al.*, 2009; and early generation integrated climate models, Smith *et al.*, 2001). The latter is motivated by the idea that sustainability problems are often best understood by analysing human-environment interactions in particular locations and at relatively small scales (reviewed in Wilbanks, 2015). The former is (implicitly) based on the ceteris paribus notion, in the sense that it conceives of the drivers of environmental impacts as more or less fixed and stable, with modifying interactions often fleshed out as the research progresses (*e.g.* research exploring modifying role played by institutions within the IPAT framework). The localist tradition is typically sceptical of this level of idealisation. They argue that the proper scale of analysis of sustainability processes is often the local one, either for reasons of analytical tractability, or on the grounds that macro level approaches involve the sacrifice of process detail, or in the belief that human-environment interactions are strongly context-sensitive (and that this heterogeneity is not captured or is averaged out in macro scale approaches; *e.g.* Clifford and Richards, 2005; Wilbanks, 2015; Butzer, 2012). However, the localist tradition often practices its own form of idealisation or isolation – for example in focussing on a relatively small number of locations, drawing on data from micro level units (*e.g.* individuals or households), and neglecting contextual effects that do not vary within the immediate environment (*e.g.* political institutions, culture, *etc.*).[1] See Liu *et al.* (2013) for a recent critique along these lines, but see also Richards and Clifford (2008) for the argument that isolation or bounding in field studies can often be a virtue, rather than a flaw. Moreover, it is a category error to view macro approaches as intrinsically place-insensitive. The distinction between the two traditions turns on the scale at which context is taken into account, not on whether context is taken account of at all. Researchers in the localist tradition often favour sustainability action (*i.e.*

[1] We owe this point to Tom Dietz.

policy or technological responses) at relatively local scales and that is tailored to context. An important critique of this stance is that locally optimal policies may come at the cost of shifting externalities to other regions (Wiener and Graham, 2009). Finally, where there are important scalar interactions (and spatially explicit datasets are available), techniques such as multi-level modelling can allow for the integration of macro and micro approaches (*e.g.* Soranno *et al.*, 2014; see Cash and Moser, 2003, and Wilbanks and Kates, 1999 for influential discussions of scale). More on some of these issues later.

2.4. Concepts of place: a rough sketch of objectivist and interpretive accounts

One enters dangerous territory when trying to mark out a clear set of meanings of place. Outside of human geography it remains a rather under-theorised notion, often plays a latent rather than explicit role in conceptual and empirical work (Casey, 1996, 2013), and is notoriously resistant to formalisation. However, recent work has helped to clarify some core interpretations (Massey, 2005; Casey, 1996, 2013), which, together with the burgeoning interest in the concept (or cognate terms) in various disciplines (Casey, 1996, 2013; Kohler, 2002; NRC, 1999; Sampson, 2012, 2013; Escobar, 2001; Williams, 2014), makes now a good time for theoretical reflection and some first steps towards taxonomy building. We begin by classifying a weak objectivist interpretation of the term, wherein place is conceived of as the stage upon which one explores general or universal aspects of the world. Place here is the location where universal or macro level processes play out or become realised. On this account, places have no real agency of their own; they are passive recipients of supervening forces. However, they may carry certain features which make them useful sites for enquiry, or they may simply be of value to us *qua* places. At the opposite of the scale, we classify a strong objectivist account, which conceives of place as the fundamental context in which social and environmental mechanisms operate (Sampson, 2012, 2013; MacGillivray, 2015). This perspective conceives of places as possessing agency of a sort, and views causal mechanisms and their form and contributions as being crucially dependent on the setting in which they are embedded (an unwavering commitment to the placed nature of social and environmental objects and processes). In between these strong and weak poles we might position spatial analysis, which explores the dimensions of context (or place) that moderate otherwise relatively general spatial relationships (Johnston *et al.*, 2014). In a somewhat orthogonal tradition, the interpretivist perspective views place in opposition to space – places, roughly speaking, are spaces filled up with meanings, with narratives, with interpretations (Tuan, 1977; Gieryn, 2000). These senses or meanings of place are contested, negotiated, and fluid (Gieryn, 2000), which implies that understanding place has a temporal dimension as well as a spatial one. This perspective is closely linked to the view of place as central to the development of informal or experiential knowledge and worldviews (Basso, 1996); those factual beliefs, folk theories, norms, and values that come from being *in situ* for a given period of time.

2.5. On boundary objects and boundary devices

Boundary objects are things that have some shared identity, whilst retaining a degree of plasticity that allows them to be moulded or re-interpreted to fit the needs, interests, or perspectives of diverse actors and social groups (Star and Griesemer, 1989). They allow heterogeneous groups to work together in the absence of consensus. Place seems to carry such characteristics – interpretive flexibility, together with *some* commonality in understanding – that suggest its usefulness for performing an integrative role in sustainability science (NRC, 1999). Here we use the term boundary *device* – rather than object – to emphasise our instrumental, normative intensions. That is, we are suggesting place not simply as an idea around which diverse research traditions can *organise*, but also because we think that it can make substantive contributions to sustainability science as a

concept. It can contribute to theoretical reflection, guide methodological innovation, and inform empirical research. Our logic is that even though many drivers of sustainability problems are global (*e.g.* atmospheric levels of greenhouse gases), their impacts are mediated through variables that are spatially clustered at multiple scales, moderated by contextual features of the local environment, and interact with other (localised) stressors. In other words, they are fundamentally placed (MacGillivray, 2015; NRC, 1999). Moreover, taking place as a central concept may also help publics and researchers find some common ground on sustainability issues – for example, it can act as an engagement device by highlighting the concrete and local implications of otherwise fairly abstract global threats such as climate change (Adger *et al.*, 2011; MacGillivray, 2015), and by drawing attention to the relevance and legitimacy of informal and often local ways of understanding and evaluating risks (*e.g.* indigenous knowledge systems). Attention to place may also act as a bridge between research and policy. Although common wisdom tends to see policy-making as favouring relatively abstract, general, timeless forms of knowledge (the "view from nowhere;" Nagel, 1989), this is perhaps an over-simplification, and in some situations may be more false than true (MacGillivray and Richards, 2015; MacGillivray, 2015; but see Porter, 1996). In some policy domains and regimes, the cautious language of contingency, context, and heterogeneity can find favour. In short, place can *do* things for sustainability science and action. As such, boundary device seems an appropriate term.

3. Conceptual developments on place, and their implications for sustainability science

Here we distil and build upon the contributions of the special issue to develop four core arguments.

3.1. *Place is not solely an interpretivist or post-positivist perspective on sustainability, it is also congenial to mechanistic or positivist ontologies.*

Given that various threads of the place literature take critiques of positivism as their points of departure (Williams, 2014), there is perhaps a natural tendency to view place as a solely interpretive or phenomenological concept. However, the concept of place as location or context has a long history of (perhaps latent) use in statistical theory (*e.g.* the related notions of external validity and generalizability; Cox, 1958) and by extension in the host of disciplines and problem areas that rely on statistical principles for experimental design or the analysis of observational data. Moreover, whilst it is true that philosophers of science have historically had little to say about place, the shift from covering law models of explanation towards causal accounts has led methodologists and philosophers towards a renewed interest in mechanism-context relations (e.g. Sampson, 2012, 2013; Cartwright, 1999). MacGillivray's contribution (2015) builds on these ideas in developing a mechanistic account of place as the fundamental context in which social and environmental mechanisms operate, before deploying this account to characterise recent transitions towards spatially explicit approaches to climate change science and policy. He suggests that this reflects a shift within climate science from a Galilean ontology which views place as a mere stage on which general laws play out, towards an Aristotelian perspective that sees places as an active ingredient in constituting and shaping social and environmental mechanisms. He concludes that a focus on place, heterogeneity, and context can enhance the policy relevance of climate change science, and inform robust and effective climate governance. This shows place to be congenial to positivist and realist perspectives (the distinction turning on whether the mechanisms are observable). Chapin and Knapp's (2015) contribution highlights another subtlety, which is that interpretive, humanistic perspectives on place can also be analysed in mechanistic terms, for example in considering how narratives, senses, or attachments to place can shape, encourage, and constrain ecosystem stewardship. Individuals, groups and institutions act based (in part) upon their subjective interpretations, meanings, and senses of the places that they inhabit, and these actions can have

implications for a range of micro-macro sustainability issues, from climate change to habitat loss. In short, interpretations may carry material consequences – they can be shaped by, and reshape, places.

3.2. *Place does not entail a retreat from theory into particularism or thick description; it is coherent with attempts to provide explanations*

The notion of place is often associated with scepticism for general, universal knowledge, but this does not imply that place-based research is restricted to the collection and cataloguing of *particular* facts about the world, tied together only by thick descriptions rather than theoretical accounts. MacGillivray's (2015) contribution emphasises that a focus on the placed or located nature of social and environmental facts and mechanisms is entirely coherent with attempts to provide *explanations*. Or at least, this is true under accounts that view the identification and analysis of causes as the heart of explanation, rather than the subsumption of facts under covering laws (*e.g.* Kincaid, 2012, Lane, 2001, Richards, 1996). Causes, rather than laws, are what matters for sound policy making, as one can reliably plan to intervene on causes (whether via technology, incentives, or communication), but not on purely statistical or phenomenological regularities. Moreover, analyses that are placed in this sense may also *in principle* uncover explanations of a somewhat general nature – although this is a thornier issue. For example, the Chicago school of sociology – characterised by an unwavering commitment to the located nature of social facts in both space and time (Abbott, 1997) – regularly faced the critique: *it's only Chicago*. They often countered with the riposte that Chicago was the ideal sort of place for understanding the mechanisms or processes or urban life in a fairly general way (Gieryn, 2006). With this intellectual move, Chicago became a placeless kind of place – the particularities and contingencies were waved away, and it was portrayed as a location where truths about *cities* can be discovered in a particularly efficient and clear way (Gieryn, 2006). Parkhill *et al.*'s contribution (2015) attempts such a move in arguing for the general relevance of their analysis of three community-based energy initiatives in the UK. Their case studies highlight the critical role of social capital and collective efficacy in developing and maintaining locally-driven transitions towards low carbon trajectories.

3.3. *Place does not imply a sedentary, parochial approach to sustainability science that neglects interactions across scales and with distant places.*

The local-scale tradition within sustainability science has at times been critiqued for practising its own form of isolation of idealisation (whilst simultaneously critiquing macro approaches for being reductive). The rough charge is that its localist commitments often lead it to neglect or pay insufficient attention to: micro-macro scalar interactions; dimensions of context that play fundamental roles in moderating social and environmental processes yet that exhibit limited variation within the geographic scope of typical case studies; and important interactions across distant places that are characteristic of many modern sustainability problems (*e.g.* see Liu, 2013). These charges have often carried force. However, in their emphases on scale (Wilbanks, 2015), network relations (Bush and Mol, 2015), and assemblages (Palmer and Owens, 2015), many of our contributors reject static and isolated conceptions of place. They highlight instead its fluid nature, the ways in which places are often inextricably linked with distant locations, and the manner in which local processes often shape, and are reshaped by, processes operating at meso and macro scales. In putting these ideas to work, they implicate the homogenising instincts characterising the governance of biofuels (Palmer and Owens, 2015) and tuna fisheries (Bush and Mol, 2015) in the lack of substantive progress towards sustainability in these domains. In a similar vein, Chapin and Knapp's contribution (2015) explores how sense of place may take form in non-local contexts, suggesting that individual and group attachment to *types* of places (*e.g.* rainforests), and to places

with particular *attributes* (*e.g.* reserves holding iconic species), may play a critical role in progressing stewardship and conservation goals at regional and trans-national levels. When one conceives of places as possessing agency of a sort (rather than mere passive recipients or containers), then it becomes natural to think of them as being continually in the process of shaping, and being shaped by, a range of mechanisms and networks at various scales and locations. Put another way, places are not sedentary, they are continually evolving. Conceptualising and analysing places as being on (contingent) trajectories may suggest intervention points that could re-orient them towards more sustainable pathways.

3.4. *Building public spheres for deliberating upon environmental problems is not equivalent to "placing" democracy –local forms of participation can act to close-down deliberation and marginalise informal knowledge if they impose norms that emphasise abstract, context-independent evidence.*

Plato was famously fearful of the public sphere, and in particular of the danger that unfettered democracy may be held hostage to rhetoric and passion, rather than reason or formal argumentation (Hacking, 2014). He sought comfort in the idea that logic and mathematics could discipline the reasoning of potentially unruly democratic participants, and by extension secure rational governance (Hacking, 2014). On this vision, public spheres would be located yet at the same time curiously placeless forums for deliberation, where arguments would stand or fall based on how they stacked up with regard to the universal and context-independent norms that define mathematical and logical reason. Move forward a few millennia and we often find similar commitments embedded in institutions responsible for public engagement on risk and sustainability issues (Wynne, 2006). That is, alongside official statements on the importance of conducting two-way, upstream public engagement on risk, technology, and environmental issues, one often finds institutional routines, practices, and methodologies that reflect a restrictive sort of pluralism (Wynne, 2006). Common critiques are that they bracket off certain ethical concerns, impose narrow problem frames (*e.g.* constructing environmental problems as "risk issues" whose characterisation will turn largely on propositional facts), are exclusionary to informal knowledge (favouring evidence that fits within formal frameworks, and that is context-independent and universal), and are often pursuing engagement for narrow instrumental reasons such as to dampen or manage controversy (Stirling, 2008; Wynne, 2006; Wynne, 1982). Bremer and Funtowicz's contribution (2015) highlights some of these issues, in tracing out attempts to construct a participatory approach to resource management in New Zealand's Waikaraka Estuary. They caution against what they call a Cartesian approach to synthesising strands of evidence within a framework that emphasises abstract, general knowledge, and argue instead for post-normal approaches to resource management, drawing on ideas such as extended peer review. Designing public spheres for deliberation that are meaningfully placed and participatory is a non-trivial task, but seems to require at a minimum institutions that respect place-based sustainability science (defined below), that draw upon informal knowledges that are difficult to fit within mathematical frameworks such as cost-benefit analysis, that seek to open up rather than close-down the bounds of reasonable ethical enquiries, and that have the humility to recognise that the possibility to secure timeless, universal knowledge of human-environment interactions – and by extension the practices of complete prediction and control – is often illusory (Stirling, 2008; Wynne, 2006; Bremer and Funtowicz, 2015). Equally, of course, one should be wary of romanticising local knowledge systems, at least if we are to take the idea of expertise at all seriously, and cautious not to idealise local value commitments, as they may carry their own forms of power or domination (Escobar, 2001).

Regrettably, the scope of our special issue does not extend to poverty alleviation or economic development. But see Scott (1998), Deaton (2010), Lambin *et al.* (2001), Luers *et al.* (2003), and

Easterly (2001) for analyses of the critical role of place in these domains (*e.g.* the role of context in shaping mechanisms of development, and the relevance of local, often informal knowledge systems), and of the implications of the (frequent) failure to take account of this in the design and implementation of development policy.

4. Conclusions

We end by (immodestly) sketching out a working definition of place-based sustainability science, drawing upon the work of our contributors and the ideas of Sampson (2012, 2013) and Cartwright (1999). We suggest that a place-based approach to sustainability science entails a relentless focus on context. It requires sensitivity to: the spatial patterning of socio-environmental processes; to the way that various dimensions of context moderate such processes; to heterogeneity in the mechanisms that govern human-environment interactions; to the networked nature of places; and to the fluid, contested, and constructed subjective interpretations of those interactions and their implications. Moreover, it takes these aspects as central points of investigation, rather than as mere modifiers of more general, universal, and abstract processes. Cashing out this perspective in practice faces substantial methodological and epistemological challenges, a fact that many sustainability scientists working from micro-macro levels will be intimately familiar with. Hopefully the papers in this issue have made useful progress along these lines.

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