The Whole of Culture Approach: A Research Agenda to Support Transition From Risk Management to Risk Sensitive Development

Mark Pelling and Maud Borie

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Tomorrow's Cities is the UKRI GCRF Urban Disaster Risk Hub

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Our aim is to catalyse a transition from crisis management to multi-hazard risk-informed and inclusive planning and decision-making, for cities in low-and-middle income countries.

Globally, more than two billion people living in cities of low-to-middle income countries are exposed to multiple hazards such as floods, earthquakes, landslides, volcanoes and fires, which threaten the cyclical destruction of their lives and livelihoods. With urban areas expanding at unprecedented rates, this number is expected to reach four billion by 2050.

Failure to integrate multi-hazard disaster risk into urban planning and decision-making presents a major barrier to sustainable development, including the single greatest global challenge of eradicating poverty in all its forms.

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ECCI High School Yards, Infirmary Street, Edinburgh EH1 1LZ

Introduction

Managing disaster risk is about a good deal more than disaster risk management. Risk and loss arise from the accumulated legacy of decision-making and decision-making contexts that enmesh the environmental, technological and human to go far beyond the purview of risk managers, humanitarian agencies and first responders. How then to orient disasters research to better open development processes and attendant governance as central components for risk reduction? The *whole of culture* approach offers one response to this challenge. Influence over disaster risk and loss outcomes is shaped by the intersection of individual decision-making processes with informal and formal norms, organisational structures and tools. Human behaviour as part of development does not have a linear association with policy, norms or capacity but brings multiple, often hidden and open-ended, interactions between identity, behaviour, framing systems of legislation and social norms cross-cut by knowledge.

Knowledge is always contested and contextual. Science methodologies attempt to make their social framing and underlying assumptions transparent, but are not always successful in communicating these. Once in the public domain even the most transparent and careful science products become part of a knowledge ecosystem including local knowledge, personal experience, social media and the vested communications of government, civil society and private sector interests (Nalau et al 2018). We argue that amongst this complexity, knowledge production, control, interpretation and use offers a key to understanding action within development that influences risk. This view holds for individuals at risk and also for planners, investors, managers and politicians holding influential decision-making positions. The perspective offered derives from contemporary work on social theory including assemblage theory and science and technology studies and from methodological experience, especially in coproduction, interdisciplinarity and action research.

The whole of culture approach is proposed not only because of recent innovations but also in response to a renewed sense of urgency around the need for joined up action on the root causes of risk. Risk root causes are embedded in ongoing and everyday development vision and actions, yet risk management finds it difficult to be a central concern for development actors. This is a longstanding challenge. In 1983, James Hewitt observed that disaster risk management was an archipelago to development – connected but at the same time held at distance, informing but marginal to development vision and outcomes. This characterisation of a disaster risk science and management toolkit somehow removed from the levers of decision-making continues today. Lewis and Kelman (2007) capture the current concern by calling for an extension in the focus of risk reduction to confront also risk creation – the knowing or accidental creation of vulnerability and hazard exposure through development decisions from the household to the international. This concern is heightened as processes of globalisation and interdependent infrastructure systems (including those of the informal sector) mean that risk and loss can cascade across places with impacts moving across sectors (UNDRR 2013). Already heightened by the observed effects of climate change as an impact multiplier on development failure, the COVID-19 pandemic has accelerated this concern. The impacts of COVID-19 and management responses have demonstrated how many of the root causes of vulnerability to natural hazards (overcrowded dwellings, inadequate access to clean water, limited primary health care, educational inequality, social marginalisation, exposure to violence, distrust of official agencies) are made worse by the predominant economic and social structures at the heart of development. These inequalities have long been recorded, the association with disaster risk long known, but development practice has been consistently ineffective in taking action.

The paper first accounts for the ways in which culture has been brought into risk and disaster studies and then describes the long-standing desire from researchers and practitioners to better understand and act on risk creation as a development, not a risk management concern. The whole of culture approach is built from innovation across assemblage thinking, science and technology studies, interdisciplinarity and coproduction which are presented and then summarised before being applied to an urban research programme to test the relevance of the approach.

Culture and Risk

It is with some trepidation that culture in invoked, recognising both the considerable legacy research on risk and culture but also the constraints that past work has imposed on the analytical positioning of culture to better understand risk production and management (Cannon and Schipper 2014). The whole of culture approach builds on past attempts to deploy culture as a lens into disaster risk reduction. These can be organised into four interpretations. First, those that study 'risk culture' as the relationship between perceptions, values, attitudes and behaviour – sometimes falling into a linear determinism, for example according changing attitudes on drink driving to changed behaviour (Bangkoff 2013). Second, a 'culture at risk' perspective, that asks whose framings of value are given priority in protecting material and other cultural artefacts. Third, a 'risk and culture' approach that argues social organisation is the most important determinant in shaping action on risk so that changing risk perception or action requires first change in organisational structures (Douglas and Wildevsky 1982). Fourth, 'culture as code' especially for complicated social categories like community or diversity (e.g. gender, ethnicity) (FitzGerald 2010). All these interpretations have value – but each tells only part of the story of the interaction of human constructions (material, organisational and imaginary) with risk production. The whole of culture approach looks to provide a comprehensive view of what culture is, to avoid linear determinism and retain the critical perspective that asks whose interests are predominant in observed expressions of culture. Risk culture is used here to describe the multiple, messy, variously complete activities, tools, physical infrastructures, development programmes, legislation, organisational forms and evolving viewpoints that come to bare when development is the focus for understanding and mitigating the production of risk.

Our overarching vision of culture follows an anthropological tradition, referring to the multiple forms that human activity and imagination unfold spatially and historically. This includes seeing culture as a capital (Bourdieu, 1979), used strategically by individuals to influence social processes. In the literature, different dimensions have been characterized as cultural, such as *political* cultures and *epistemic* cultures, some also refer to cultures of rationality (Hewitt 2015). In this contribution we refer to a *cultural* framework for three main reasons.

1. **A *cultural* framework recognizes the existence of the diversity of ways in which people understand and manage risk across places, as well as the different ways in which knowledge is, or not, used for risk management and how it feeds into different imaginaries, discourses and policy around DRM.**

2. **This framework underlines the importance of place-based specificities to achieve change reflexively. Risk cultures take different forms and there is no 'one-size fits it all' way to transition towards a more integrated approach.**

3. **Recognizing the cultural dimension of disaster risk management implies that there are multiple potential and actual agents and some choices to be made in the way DRM is conducted – in other words, recognizing culture helps avoiding deterministic explanations and is an invitation to think about power distribution and responsibilities.**

This does not entail a simplified understanding of agency but rather one where the influence of non-human actants in facilitating the emergence and stabilization of particular risk culture is included in the analysis. The whole of culture concept for risk management is distinct from Mary Douglas' work on cultural risk theory, which highlights four different attitudes to risk (e.g. 1983; 1999). We seek to draw attention to the ways in which risk management is institutionalized rather than on the diversity of individual attitudes towards risk. In this respect risk culture resonates with the idea of 'civic epistemology'. With this concept, Sheila Jasanoff seeks to make sense of existing differences between countries regarding what is regarded as authoritative expertise and relevant evidence to address particular policy issues (e.g. regarding nuclear power or biotechnologies). Any attempt to trigger change, in this case towards a more integrated approach for disaster risk reduction, needs to first consider the form of the institutionalized risk culture.

A precursor to this agenda is the recognition, especially well developed in drought (Abudu Kasei et al 2019, Ajayi and Mafongoya 2017) and flood (Hooli 2016) studies, that diverse knowledges (including emotional, experiential, local and traditional knowledges) influence risk behaviour and need to be understood and engaged with in addition to the advances by knowledge rooted in scientific method and positivist epistemology made (e.g. to hazards processes, engineering and some behavioural studies). Recognising diversity is the first step to bridging conflict rooted in different knowledge production processes. Connecting in more equal interactions technicians and planners schooled in positivist science with residents at risk who understand the world also through experience and emotion (Ebhuoma and Simatele 2019; Makondo and Thomas 2018). This brings in the importance of communication tools, language and style, metrics, datasets, modeling tools and mandates of diverse policy positions and stakeholder viewpoints, reaching out from development agencies into cultural institutions from social media to museums and formal education.

The Development-Risk Relationship: From the Relief Continuum to the Nexus

Framing the relationship between disaster risk management and development has evolved from linear models focused on the post-event opportunity for reform, including the relief continuum (Buchanan-Smith and Maxwell, 1994) and relief contiguum (Harmer and Macrae, 2004), to multi-directional, systems frameworks focused on mainstreaming risk reduction into development, including the development-risk nexus (Warmsler 2015).

Disaster events disrupt business-as-usual opening scope for directional changes for more socially progressive or regressive outcomes. Institutionalising progressive change – for example by shifting to more inclusive, pro-poor development models – has been associated with large events impacting on already divided polities where incumbent powers have grossly distorted recovery funding and opposition groups have captured the symbolic value of the disaster in popular debate (Pelling and Dill, 2010). Urban earthquakes demonstrate this well including Mexico City and Guatemala. More widely, disaster response and recovery accelerates the pre-disaster status quo leading to increased social inequality.

Humanitarian action has been part of the problem, with rapid, top-down action sweeping aside local capacities and norms (Wisner 1983). Responding to these concerns, humanitarians have sought to extend their remit into development, or to bring development practice into the humanitarian process in the relief continuum. This presented a linear relationship between disaster response and development (Lewis, 2001), extended across the disaster cycle by the relief contiguum (Buchanan-Smith and Maxwell, 1994) that incorporates governance and human rights into disaster response and recovery (Mosel and Levin, 2014). These frameworks are limited by their linear viewpoint, but are useful in introducing the importance of strategic vision and shared principles to bridge between humanitarian and development action (Harmer and Macrae, 2004; EC, 2012). They emphasise the need for research to piloting and documenting experiments that bring long-term planning and humanitarian practice alongside each other at the levels of vision, policy and practice (Harmer and Macrae, 2004; Buchanan-Smith & Fabri, 2005; Mosel and Levine, 2014). Mosel and Levin (2014) outline six ways in which the humanitarian and development sectors could better align by being: flexible and risk taking with an openness to learning; beginning interaction with a thorough context and political analysis; working with local institutions; including joint analysis and learning at country level; be centred on realistic programming and; promoting adaptive capacity. Murphy et al (2018) report local actors priorities for enabling inclusive locally enabling development through disaster response and reconstruction through programming that emphasises psycho-social support, early livelihood support, community leadership, community cohesion, government collaboration and addressing the root causes of vulnerability.

The linear models of the humanitarian sector are attractive in their simplifying of the risk and development relationship. But they mis the messy, multi-directional flows of information, impacts and innovation that have been increasingly recognised as shaping the distribution of risk and development opportunity. As policy actors have become more sensitive to working across siloes, so a risk nexus approach has evolved in research, drawing from systems perspectives to identify synergies for sustainable risk reduction (World Economic Forum 2012). This is most mature in urban contexts where linking different dimensions and sectors might

include integrated land use, mixed-use structures, green areas, public spaces, mobility, energy systems and risk reduction infrastructure (Ranhagen and Groth 2012). In this tradition, and building on Wamsler (2015) six sites for mainstreaming risk reduction into development have been identified that help to build the whole of culture approach:

1. Add-on risk reduction: implementation of specific programmes or projects to reduce risk and are not part of the implementing body's core activities;
2. Programmatic mainstreaming: modification of sector specific programme work to reduce risk creation and maximise potential to reduce risk;
3. Organisational mainstreaming: modifications to organisational management, policy, legislation, working guidelines and project implementation tools to ensure the integration of risk reduction in local programmes/projects;
4. Internal mainstreaming: modifications to an organisations operations and policies to reduce its own risk – including risks to reputation and allow functioning during events;
5. Inter-organizational mainstreaming: promotion of cooperation between existing actors for capacity development and harmonisation of effort (including citizens, private sector and government);
6. Educational mainstreaming: support for a conceptual shift in the philosophy driving education and training to incorporate risk reduction into the activities of professionals and popular actors and increase science-policy communication and integration.

Taken together these actions describe a tightly delimited agenda for the whole of risk approach that brings together project level work with scope for immediate impact, work with organisational structures and decision-making to effect change in the medium term, and foundational mainstreaming that can lead to the long-term reframing of the development-risk nexus. Discussion below presents recent theoretical and methodological advances to help further sharpen focus.

Theoretical Openings: Assemblage Theory and Civic Epistemology

Different theoretical positions entail different visions of what counts as policy-relevant knowledge and how it should be produced (Granjou and Arpin 2015; Jasanoff 1987). They are also associated with different understandings of science-policy interactions and expectations regarding what expert and science-policy organisations ought to be doing to be 'successful' (Gustafsson et al 2018). This section presents two specific advances in disasters studies. Assemblage thinking offers a way beyond the tensions between structural and behavioural analysis that have dominated work at the interface of disaster studies and development. The notion of civic epistemology, as part of broader work on science and technology studies (STS), highlights that what counts as authoritative knowledge for policy-making varies in different settings (Forsyth 2019; Jasanoff and Kim 2009; Miller 2008).

Structural theory takes analysis and policy recommendations to a focus on hierarchies of power and their institutionalisation in legislation, bureaucratic organisation and cultural routines with change requiring structural realignment. Behavioural approaches focus on the importance of cognition (e.g. risk perception) and identity to explain decision-making and action, hence placing much emphasis on individual agency, and responsibility for change on individuals. Assemblage theory, which focuses on the interactions between multiple actors and non-humans actants, explicitly seeks to account for the complexity of the more-than-human world by drawing on a different understanding of causality where agency lies in the relations between multiple actors and organizations and in their relations with non-human actants (e.g. physical infrastructure, decision-making tools, environmental phenomena) (Farias 2011; DeLanda 2006). It is the interactions between these different elements, and associated asymmetries of power, understanding and freedom to act, that shape flows of information, imagination and action. Assemblage thinking disrupts fixed assumptions on the prioritisation of institutions, structures or individual behaviour and emphasises the importance of relationships between political actors and the mediating role played by non-human actants in open-ended

processes of understanding and action. This less fixed, more dynamic and yet specified landscape for action reflects well the lived experience of researchers working at the interface of disaster risk and development policy where local context (pre- or post-disaster), the language and symbolism of locally dominant policy actors (economists, lawyers, architects, community activists etc.) shape which science interventions have purchase on policy.

Assemblage theory has been taken up in urban studies (e.g. Farias 2011) and been identified as a potentially fruitful avenue for research in some emerging critical disaster studies (Donovan 2017) but its use in, and potential for working at the interface between disaster risk and development domains has been largely unexplored. Yet, assemblage theory provides not only a useful lens to understand the emergence, stabilization and characteristics of risk culture at this interface, but also to draw attention to the multiplicity of pathways through which transition to risk sensitive development can unfold, allowing actors to reimagine their positionality and reconsider responsibilities and actions to effect change in the management of risk.

Socio-political settings (e.g. democratic vs. authoritarian regime) are key to the understanding of risk cultures. STS examines the contexts and consequences of science and other knowledge production frameworks (including experiential and emotional intelligence, local and indigenous knowledge) of being mobilized for action. Within disaster studies the invoking of science in support of a prescribed set of aims is exemplified by the UNDRR Science Roadmap for the Sendai Framework. At the same time, science itself is a multifaceted enterprise that encompasses diverse forms of epistemology and knowledge production methods. Comparing different disciplines, Knorr-Cetina (2009) argues that each has an epistemic culture associated with specific ways of producing (what is regarded as) valid knowledge. Looking at the emergence of ecology as a discipline, Kohler also described how ecologists struggled to assert the credibility of ecology as a discipline in an age were physics were the gold standard and progressively produced their own standards and validation practices (Kohler 20002). While these accounts usefully describe the diversity of scientific practices, even more relevant here is the concept of civic epistemology, defined as: "the stylized, culturally specific ways in which publics expect the state's expertise, knowledge, and reasoning to be produced, tested, and put to use in decision-making" (Jasanoff[1]).

Civic epistemologies help understand the possibility of diverse knowledges being brought to understand specific risk-development phenomena, for example whether community based or highly technical approaches to risk assessment converge or lead to conflicting stakeholder priorities (see Donovan and Oppenheimer 2015). Diverse science approaches have diverse roles to play in facilitating reflection amongst local and city level actors on ways in which existing development produces risk and how such processes might be redirected to reduce risk. Knowing risk via vulnerability assessments is obviously different than knowing risk via technological forecasting, but more importantly entrains values and assumptions that can lead to falsely divergent risk management and development policy priorities. Recognising the role played by science and other knowledge processes in the generation and maintenance of such divergencies is a first step in unpacking the role of science and researchers as facilitators for a more integrated policy conversation.

This implies researchers and practitioners being alert to the ways in which diverse science methods connect to particular ways of knowing and managing risk (Borie et al 2019a; 2019b). If science methods to prevent major hazards are usually well institutionalized at city level (e.g. existence of risk management units; command and control centre for disaster) this is not necessarily the case of methods oriented towards understandings of everyday risk – which are often led by NGOs and outside the remit of local authorities. For the characterization of risk cultures at the city level as part of policy transition, this highlights the importance of understanding existing ways of knowing risk and associated forms of expertise, as well as decision-making practices (see also Swedlow 2012). In addition to socio-political settings, characterizing risk cultures requires considering whose expertise and knowledge is used at this-level, including what types of tools and data are used (e.g. quantitative, qualitative, local) and how people make sense of these. How, for example whether in a top-down or participatory manner - and for which purposes - e.g. whether to improve infrastructural

[1] https://sheilajasanoff.org/research/civic-epistemologies/

resilience and safety or else, are also key dimensions. All of these dimensions matter to identify narratives and practices around risk, factors hampering transition towards integrated risk management and transformative change.

Methodological Openings: Coproduction, Interdisciplinarity and Action Research

The Science and Technology Roadmap for Sendai (UNISDR 2019) emphasises solution driven research to enable transition, including: multi-disciplinarity, open access to data and analysis, equitable partnerships, building capacity through research partnerships and participatory research and building networks for action. The diversity of science, from natural or physical to social and extending into arts and humanities, is given expression through a wide range of traditions working at this interface. Applied research, citizen science and most recently the emphasis on codesign and coproduction of knowledge as part of the impact agenda and broader focus on transdisciplinarity trace the ways in which science in all its expressions seeks intentional engagement with policy and practice.

Overcoming the separation between knowledge production, communication and action, through collaboration between science and policy or practical actors is essential in addressing the development-risk nexus. This demands an extended attention of researchers and other knowledge providers to facilitate informed knowledge uptake and its accountable deployment, including by those at risk or otherwise marginalised from contemporary decision-making processes. Coproduced research provides one mechanism to bring risk and development actors together. Coproduction brings collaboration between researchers, policy or practical actors to co-define problems, research and wider knowledge production methods, analysis and action for uptake. At the interface of risk and development coproduction opens collaboration between actors working at different levels of authority (local to global institutions) and over contrasting time-frames (real-time risk avoidance to long-term education).

In search of actionable knowledge, scholars have devised a number research approaches and methods, including action-research and participatory methods, and elaborated a number of principles (as exemplified in Sendai Framework) to guide researchers in this endeavour (see Dewulf et al 2020; Beier et al 2017). Co-production, as the shorthand for producing knowledge together, is perhaps the most current, but debates around anticipatory governance and responsible research and innovation (RRI) also put forward a number of principles – e.g. reflexivity (see Voss et al 2006). While the former approach, particularly widespread in sustainability science and global change research (e.g. the rhetoric of Future Earth), aims predominantly at enhancing impact, the latter explicitly draws on a conception of science and technology as performative and critically discuss the role of researchers and their accountability towards society. While, methodologically, we adopt what might be termed as a co-productionist approach, consistent with assemblage theory we however draw on a constructionist conception of science and technology sensitive to their social and material implications. This also implies recognizing that researchers are not only 'knowledge producers' but also catalyzers of new social interactions – and potentially transition.The framing of science's engagement with risk management as a cultural assemblage helps reveal the multiple relations it is made of and identify its sub-components and so to highlight opportunities and strategies for transitioning towards greater integration with development planning and practice. Cultural assemblages bring together discourse, institutions, practice and objects as components of cultural systems. These cultural elements are often unevenly distributed and confer unequal control and deployment of knowledge and power to particular interest groups. Understanding not only the characteristics of such cultural elements within any risk management assemblage but also the processes through which they are owned, controlled, deployed, reproduced and resisted points to entry points for interventions that seek a more inclusive, informed and integrated role for risk management as an integral component of sustainable and resilient development futures.

The Whole of Culture Approach

Being comprehensive about culture has led us to see risk as a property of development and to acknowledge the centrality of knowledge coproduction in ever emergent processes of negotiation, struggle and resistance. The implications for a whole of culture approach are threefold. First, to be more serious about the ways in which dominant and alternative (or emergent) values, discourses, policies, organisational structures and practices of development translate root and proximate causes of risk into experienced loss. Second to work across these fields to understand their interactions and where action oriented and normative research might be most effectively placed to support transitions towards more inclusive development for equitable vulnerability reduction. Third, to recognise the moral hazard implicit in narrowly defined technical research that offers enhanced tools for use by existing powers. For example, work on building standards, or risk assessment tools underpinning land-use that do not ask who will use and act on new knowledge or the countervailing pressures faced by planners that mean research aimed at reducing risk often either has limited impact or worse can be used to justify predetermined policy preferences, e.g. the clearing of hazard exposed low-income housing areas for higher income land-uses.

Holding the challenges of root causes, fragmentation and moral hazard, and drawing from a legacy of research on culture in risk and disasters studies, assemblage thinking, civic epistemology and coproduction, knowledge (its contested generation and ownership) provides a window into the emergent processes of transition. Civic epistemology shows knowledge not only as a product of research, but as an object in an ongoing process of co-construction between multiple interested actors. This may include researchers, but researchers have only limited control on knowledge. The whole of culture approach places central importance on knowledge in these multiple forms. In summary:

- **Knowledge and action have a non-linear relationship, continuously coproducing each other.**
- **Knowledge production processes (research projects) open spaces to facilitate self-reflection, experimentation and emergent action.**
- **Knowledge is dynamic, intimately connected with identity and identity with assemblages of human and non-human actants. Change in one part of a system will have consequences elsewhere, with ethical implications for research.**
- **Knowledge is political, in the public domain it is also often contested. Researchers are not apolitical, apparent neutrality can indicate alignment with dominant interests.**

Figure 1 presents a simple model for the whole of culture approach. It identifies four fields of science and practitioner coproduction and three realms of application. These intersect with the figure presenting dominant expressions to illustrate each resulting potential research focus. The figure highlights (in orange) the degree of concentration in existing research around each intersecting realm and field. Research to enhance practical tools and performance predominate in risk management. Summarising the discussion in this paper, the whole of culture approach identifies opportunity for moving research into a more impactful relationship with development in two directions. First by extending risk research into the fields of institutions and discourse; second by extending from research on risk and its management into the realms of development and governance.

Figure 1: A simple model for the Whole of Culture approach

Realms of application *Fields of science and practitioner coproduction*	Development and its management	Risk and its management	Governance and its management
Discourse (public, policy and political)	Economic growth reduces poverty	Emergency response and reconstruction have economic and political advantages over costly risk reduction.	The place for civic inclusion is in policy delivery rather than formation.
Institutional frames (legislation, policy, organisational structure, decision-making norms, guidelines)	Capital investment in productive infrastructure is prioritised above investment in primary health and public education	National Adaptation Plans of Action (UNFCCC) and Sendai Framework reporting encourage integrated policy	Decentralisation of specific responsibilities from national to local government can reduce national expenditure and increase compliance.
Practical tools (decision-support tools including risk models, regulatory tools)	Social and environmental risk assessments applied to large capital projects	Risk modelling and event forecasting give confidence to policy for early warning and emergency response	Social media is an increasingly important arena for policy influence.
Performance (of actors on the ground and within organisations)	Social and environmental risk assessments dominated by expert viewpoints and vulnerable to lobbying by powerful interest groups.	Highly technical risk modelling and forecasting tools require high levels of training and investment in computing and communications.	Clientalisitc relationships predominate in shaping action between local populations and elected politicians.

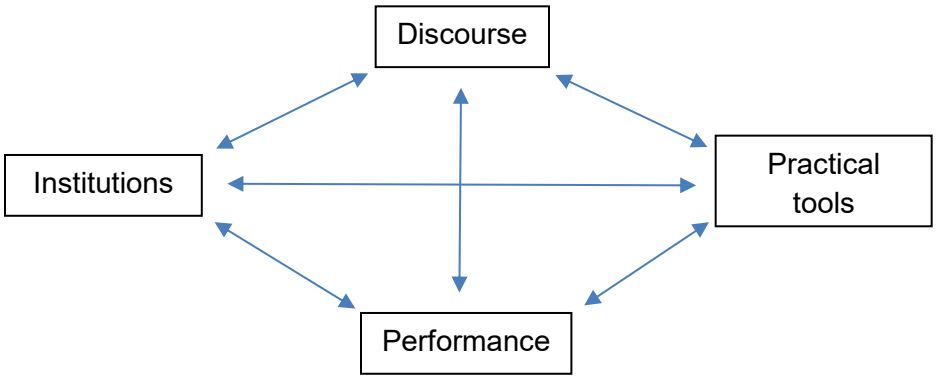
Key: Darker green indicates fields of research from the disaster risk reduction community is most mature, lighter orange indicates fields where there is considerable space for innovation. In field text is indicative only.

Introducing knowledge coproduction into Figure 1 helps to provide a logic for the identification of priority research questions. Each field provides an entry point for working across the realms and other fields of the risk-development nexus to confront the challenges of root causes, fragmentation and moral hazard. These entry points suggest questions about the ways in which cocreated knowledge informs other sites, as well as how its cocreation is influenced. Asking, for example, from the perspective of discourse, how assumed and alternative knowledges reproduced through popular discourse position public understanding of development, risk and governance and how these understandings are used by different actors to make sense of, legitimate or question institutions, practice and performance in the development-risk nexus. How dynamic conditions

(e.g. social change, disaster impacts, technological innovation) interact to open or close sites for the emergence of alternative discourses and attendant assemblages of institutions, practice and performance, including the ways in which specific tools, e.g. risk models are used by particular development actors. Similar questions arise from a viewpoint of institutional analysis – how legislation, organisational form or practical guidelines intersect with actual performance on the ground and within responsible agencies, how far institutions constrain or enable decision-support and other tools to impact on outcomes and provide bridges across development, risk management and governance.

The fields of practice and performance represent existing concentrations for research on risk. The whole of culture approach asks those working on practical tools, for example on risk modelling to consider how these tools can be amplified (or might be marginalised by) development planning tools and decision-support for governance, how their modelling considers constraints on performance and practice in projecting risk and loss outcomes and how their tools and the analysis produced fit within or help articulate points of challenge for priorities in future development, risk and governance expressed through popular and policy discourse. Research on performance including community based analysis is encouraged to look beyond the local at the ways in which considerations of overarching popular and policy discourse help to shape local action or compliance in the face of risk creation, how far local knowledge can shape local and wider interventions to reduce risk and how far individuals both from local communities and those working in responsible agencies are able to innovate and influence institutional process and outcomes. Figure 2 summarises the culture of risk approach even further to identify the web of relationships that lie between each field as the key sites for research on knowledge coproduction and its use.

Figure 2: Webs of knowledge relationships shape the whole of culture approach



Conclusions

Cities and settlements are complex systems. Development, governance and risk dynamics in urban settings are often non-linear yet much urban risk research continues to focus on local places and proximate drivers, or to model risk as a static outcome of hazard, population distribution or idealised building form (Pelling 2003; Helbing 2013; Wamsler 2014). The whole of culture approach encourages researchers to consider research across the web of knowledge relationships and undertaken in partnership with those at risk and with development, governance and risk management actors shaping risk.

This paper argues that recent additions to the theoretical and the maturing of methodological and practical expertise in disaster studies are able to respond to this call, in ways that have not been possible before – opening a new opportunity space for a whole of culture approach. At the heart of this approach are innovations in assemblage thinking, science and technology studies (STS – including work on civic epistemology), the embracing of interdisciplinary approaches and coproductive methodologies. Together these approaches bring theoretical and methodological rigour to explore the multiple voices, viewpoints and

histories of interaction that lie across risk reduction as it is and might become. They provide analytical perspectives through which to enable comparative analysis, aggregation of results and so avoid the richness of contextual analysis call for resulting in fragmented learning and narrow localised progress.

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