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The emBRACE Resilience Framework

Developing an Integrated Framework for Evaluating Community Resilience to Natural Hazards*

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6.1 Introduction

Community resilience has become an important concept for characterising and measuring the abilities of populations to anticipate, absorb, accommodate, and recover from the effects of a hazardous event in a timely and efficient manner (Walker and Westley 2011; Almedom 2013; Berkes and Ross 2013; Deeming et al. 2014). This goes beyond a purely social-ecological systems understanding of resilience (Armitage et al. 2012, p. 9) by incorporating social subjective factors such as perceptions and beliefs, as well as the wider institutional environment and governance setting which shapes the capacities of community to build resilience (Tobin 1999; Paton 2005; Ensor and Harvey 2015). Many conceptual and empirical studies have shown that communities are an important scale and setting for building resilience that can enhance both individual/household and wider population-level outcomes (Berkes et al. 1998; Nelson et al. 2007; Cote and Nightingale 2012; Ross and Berkes 2014).

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Yet, 'community' remains poorly theorised with little guidance on how to measure resilience-building processes and outcomes. Both terms – resilience and community – incorporate an inherent vagueness combined with a positive linguistic bias, and are used both on their own as well as in combination (Brand and Jax 2007; Strunz 2012; Fekete et al. 2014; Mulligan et al. 2016). Both terms raise, as Norris et al. (2008) put it, the same concerns with variations in meaning. We broadly follow the definition of resilience proposed by the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC): the capacity of social, economic, and environmental systems to cope with a hazardous event, trend or disturbance, responding or reorganising in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation (IPCC 2014, p. 5).

In resilience research, we can detect a disparity whereby the focus of research has often been on the larger geographical scales (e.g. regions) or, as in psychological research, it is focused at the level of the individual, extending to households (Paton 2005; Ross and Berkes 2014). Across these scales, resilience is consistently understood as relational. It is an ever emergent property of human-environmental and technological systems co-produced with individuals and their imaginations. As a relational feature, resilience is both held in and produced through social interactions. Arguably, most intense and of direct relevance to those at risk are such interactions at the local level, including the influence of non-local actors and institutions. It is in this space that the 'community' becomes integral to resilience and a crucial level of analysis for resilience research (Schneidebauer and Ehrlich 2006; Cutter et al. 2008; Walker and Westley 2011).

The idea of community comprises groups of actors (e.g. individuals, organisations, businesses) who share a common identity. Communities can have a spatial expression with geographic boundaries with a common identity (see also Chapter 13) or 'shared fate' (Norris et al. 2008, p. 128). Following the approach of Mulligan et al. (2016), we propose to apply a dynamic and multilayered understanding of community, including community as a place-based concept (e.g. inhabitants of a flooded neighbourhood); as a virtual and communicative community within a spatially extended network (e.g. members of crisis management in a region); and/or as an imagined community of individuals who may never have contact with each other, but who share an identity.

Only a few approaches have tried to characterise and measure community resilience comprehensively (Sherrieb et al. 2010; Cutter et al. 2014; Mulligan et al. 2016). Thus, the aim of this chapter is to further fill this gap and elaborate a coherent conceptual framework for the characterisation and evaluation of community resilience to natural hazards by building both on a top-down systems understanding of resilience and an empirical, bottom-up perspective specifically including the 'subjective variables' and how they link to broader governance settings. The framework has been developed in an iterative process building on existing scholarly debates, and on empirical case study research in five countries (Great Britain, Germany, Italy, Switzerland, Turkey) using participatory consultation with community stakeholders, where the framework was applied and ground-tested in different regional and cultural contexts and for different hazard types. Further, the framework served as a basis for guiding the assessment of community resilience on the ground.

6.2 Conceptual Tensions of Community Resilience

One of the tensions surrounding the concept of resilience in the context of disaster risk reduction concerns its relation to social change and transformation. A divide is emerging between those who propose resilience as an opportunity for social reform and transformation in the context of uncertainty (MacKinnon and Derickson 2013; Olsson et al. 2014; Bahadur and Tanner 2014; Brown 2014; Kelman et al. 2015; Weichselgartner and Kelman 2015) and those who argue for a restriction of the term to functional resistance and stability (Klein et al. 2003; Smith and Stirling 2010).

Besides the differences in scope of the definition between bouncing back and societal change, there is another tension about whether resilience is a normative or an analytical concept (Fekete et al. 2014; Mulligan et al. 2016). The normative dimension of resilience refers to its application as a policy instrument to promote disaster risk reduction at all scales (United Nations Office for Disaster Risk Reduction 2007, 2015). The analytical dimension of resilience refers to its application as a lens to assess, evaluate, and identify options for building resilience (Cutter et al. 2008; Norris et al. 2008; Tyler and Moench 2012). Both dimensions are often not distinct from each other, but rather overlap and are substantially intertwined. Many of the tensions around whether resilience is about social change, learning, and innovation can be attributed to this close integration of normative and analytical aspects related to disaster resilience. Although it can be used as a theoretical concept, community resilience has a grounded 'reality', so its use and application in disaster risk reduction policy have implications well beyond academic debates on climate change, adaptation, and disaster risk. It affects actual people but resilience is also an integral element, at the international policy level, of both the Hyogo Framework for Action and the Sendai Framework for Disaster Risk Reduction (United Nations Office for Disaster Risk Reduction 2007, 2015) as well as of national and local discourses on disaster risk reduction, such as in the UK National Community Resilience Programme (National Academies 2012) or at the level of local authorities in the UK (Shaw 2012).

The term *community resilience* is quickly acquiring prominence in disaster risk management policy-making across all scales and is becoming part of political as well as academic discourses. Although in the context of natural hazards, community resilience is often framed with a positive connotation, resilience-based risk reduction policy inevitably produces winners and losers (Bahadur and Tanner 2014). In the UK, for example, resilience is part of a responsabilisation agenda in which responsibility for disaster risk reduction is intentionally devolved from the national to the local level (Department for Environment, Food and Rural Affairs 2011) (see Chapter 12). This creates opportunities, but is also contested and can provoke resistance by activists (Begg et al. 2016). The normative dimension of community resilience and its relation to politics require light to be shed on the role of power and the distribution of responsibilities when analysing community resilience.

In this context, resilience is 'here to stay' (Norris et al. 2008, p. 128) not only as a theoretical concept but also as a policy tool to promote disaster risk reduction. As such, it has direct implications for hazard-prone communities. Debates about whether resilience policy and practice should be limited to describing stability-oriented aspects of disaster risk reduction (DRR), whilst leaving learning and social change for other concepts such as transformation, ignore the realities of DRR action at the community level.

This importance of resilience on the ground has implications for the development and advancement of resilience theories. Frameworks of disaster resilience need to account for multiple entwined pressures (e.g. development processes, DRR, and climate change) (Kelman et al. 2015) to learn and adapt and to innovate existing risk management regimes. Limiting resilience to narrow interpretations of robust infrastructure would promote local DRR that fails to address the need for social change and reform, although these are proposed as being of critical importance to address uncertainties in the context of climate change (Adger et al. 2009).

Based on these arguments, we identify three gaps that characterise existing resilience frameworks. First, there seems to be an insufficient consideration and reflection of the role of power, governance, and political interests in resilience research. Secondly, many resilience frameworks still seem to fall short of exploring how resilience is shaped by the interaction of resources, actions, and learning. Due to the conceptual influence of the Sustainable Livelihood Framework (SLF) of some approaches (Chambers and Conway 1992; Scoones 1998; Ashley and Carney 1999; Baumann and Sinha 2001), resilience concepts tend to be focused on resources but fail to systematically explore the interaction of resources with actions and learning and how understanding these variables might then usefully illustrate disparities in how social equity, capacity, and sustainability (i.e. key considerations of the SLF approach) (Chambers and Conway 1992) are manifest. Third, an explicit elaboration of learning and change is largely absent in the literature that characterises community resilience. So far, resilience as a theory of change seems to remain rather vaguely specified.

A resilience framework which accounts for these aspects is necessarily focused on the prospects of social reform and incorporates many 'soft' elements that are notoriously difficult to measure. We thus agree with the need to operationalise resilience frameworks (Carpenter et al. 2001), but argue that existing framework measurements (Cutter et al. 2008) often fail to systematically include all of those social aspects that we consider of critical importance for community resilience.

6.3 Developing the emBRACE Resilience Framework

Developing an interdisciplinary, multilevel, and multihazard framework for characterising and measuring the resilience of European communities calls for a multifaceted approach that adopts interdisciplinary methodological processes. Therefore, we applied a complementary research strategy, with the purpose of investigating resilience at different scales, from different perspectives and applying different research methods, as well as integrating the viewpoints of divergent actors. The research strategy consisted of three strands: a structured literature review for the deductive development of the framework; empirical case study research for the inductive development of relevant framework elements and their interrelation; a participatory development and validation of framework elements with stakeholders from the case study regions.

6.3.1 Deductive Framework Development: A Structured Literature Review

The first sketch of the community resilience framework was informed by the early review systematising the different disciplinary discussions on resilience into thematic

areas. As the project continued, specialised literature reviews complemented this first review by focusing on different aspects of the framework and considering more recent publications. Throughout the project, developments in the literature were closely monitored and literature reviews were continuously updated (see Chapter 2). The literature reviews at the early stages of the project aimed at providing a point of reference for the development of the emBRACE resilience framework. By highlighting both broader thematic areas of resilience research and more specific aspects of resilience literature (focusing on operationalisation and indicators of resilience, in particular), the literature reviews offered guidance for the framework development. They helped, in particular, to systematically focus the emBRACE approach towards aspects of learning and change in community resilience, and this was substantiated in the later phases of the project through the process of indicator development in relation to the framework.

6.3.2 Inductive Framework Development: Empirical Case Study Research

The five case studies comprised multiple alpine hazards in South Tyrol, Italy, and Grisons, Switzerland, earthquakes in Turkey, river floods in Central Europe, combined fluvial and pluvial floods in northern England, and heatwaves in London. A number of qualitative and quantitative methodologies were adopted in the case study research in order to scrutinise the community resilience framework. The requirement was not to apply and test a deductively developed framework but to inductively develop constitutive factors and elements of resilience, the relationships between these elements and thus inform the deductive, participatory, and deliberative framework development by providing context-related and empirically rich results (Ikizer 2014; Taylor et al. 2014; Ikizer et al. 2015; Abeling 2015a, b; Doğulu et al. 2016; Kuhlicke et al. 2016; Jülich 2017) (see Chapter 8).

6.3.3 Participatory Assessment Workshops with Stakeholder Groups

A third strand saw three participatory workshops with stakeholders in case studies in Cumbria, England, Van, Turkey, and Saxony, Germany, in order to add to the framework development the perspective of different community stakeholders at differing local and regional scales. The aim for the participatory assessment workshops was to collect, validate, and assess the local appropriateness and relevance of different dimensions of community resilience. With the selection of case studies in different countries, different types of communities and hazards, we took into account that different cultures and communities conceptualise and articulate resilience differently. The workshops allowed discussion with local and regional stakeholders about how resilience can be assessed. This was both a presentation and revalidation of the first results of the case study work together with the stakeholders and also a starting point for further development of the framework.

6.3.4 Synthesis: An Iterative Process of Framework Development

These three strands of deductive, inductive, and participatory framework development came together in an iterative process. This means that, at several stages, the outcomes of this three-layered approach have been used to inform the conceptual framework

development. Complemented by internal review process with project partners as well as external experts on community resilience, we developed several interim versions of a synthesis framework that were again and again questioned by theory and empirical results, in our participatory workshops and the internal and external reviewing process. The empirical case study research played a core role as it helped to illustrate how the framework can be applied and adapted to different hazard types, scales, and socioeconomic and political contexts. The claim of the emBRACE resilience framework as presented in this chapter is not the final product. Instead, we consider it to be a proposal that needs further application, criticism, and improvement (see section 6.5).

6.4 The Conceptual Framework for Characterising Community Resilience

The emBRACE resilience framework conceptualises community resilience as a set of intertwined components in a three-layer framework. First, the core of community resilience comprises three interrelated domains that shape resilience within the community itself: resources and capacities; actions; and learning (see section 6.4.1). These three domains are intrinsically conjoint into a single tripartite whole. Further, these domains are embedded in two layers of extracommunity processes and structures (see section 6.4.2): first, in disaster risk governance which refers to laws, policies, and responsibilities of different actors on multiple governance levels beyond the community level. It enables and supports regional, national, and international civil protection practices and disaster risk management organisations. The second layer of extracommunity processes and structures is influenced by broader social, economic, political, and environmental factors, by rapid or incremental socioeconomic changes of these factors over time, and by disturbance. Together, the three layers constitute the heuristic framework of community resilience (Figure 6.1), which through application can assist in defining the key drivers of and barriers to resilience that affect any particular community within a hazard-exposed population.

6.4.1 Intracommunity Domains of Resilience: Resources and Capacities, Action, and Learning

6.4.1.1 Resources and Capacities

The capacities and resources of the community and its members constitute the first domain of the core of resilience within the community. Informed through the Sustainable Livelihoods Approach (SLA) and its iterations (Chambers and Conway 1992; Scoones 1998; Ashley and Carney 1999; Baumann and Sinha 2001) as well as the concept of adaptive capacities (Pelling 2011), we differentiate five types of capacities and resources. We believe that this approach also addresses in parallel the need identified by Armitage et al. (2012) for ‘material’, ‘relational’, and ‘subjective’ variables as well as the social subjective dimension of resilience (see section 6.1).

Natural and place-based capacities and resources relate to the protection and development of ecosystem services. This includes, but is not limited to, the role of land, water, forests, and fisheries, both in terms of their availability for exploitation as well as more indirectly for the personal well-being of community members. Place-based resources

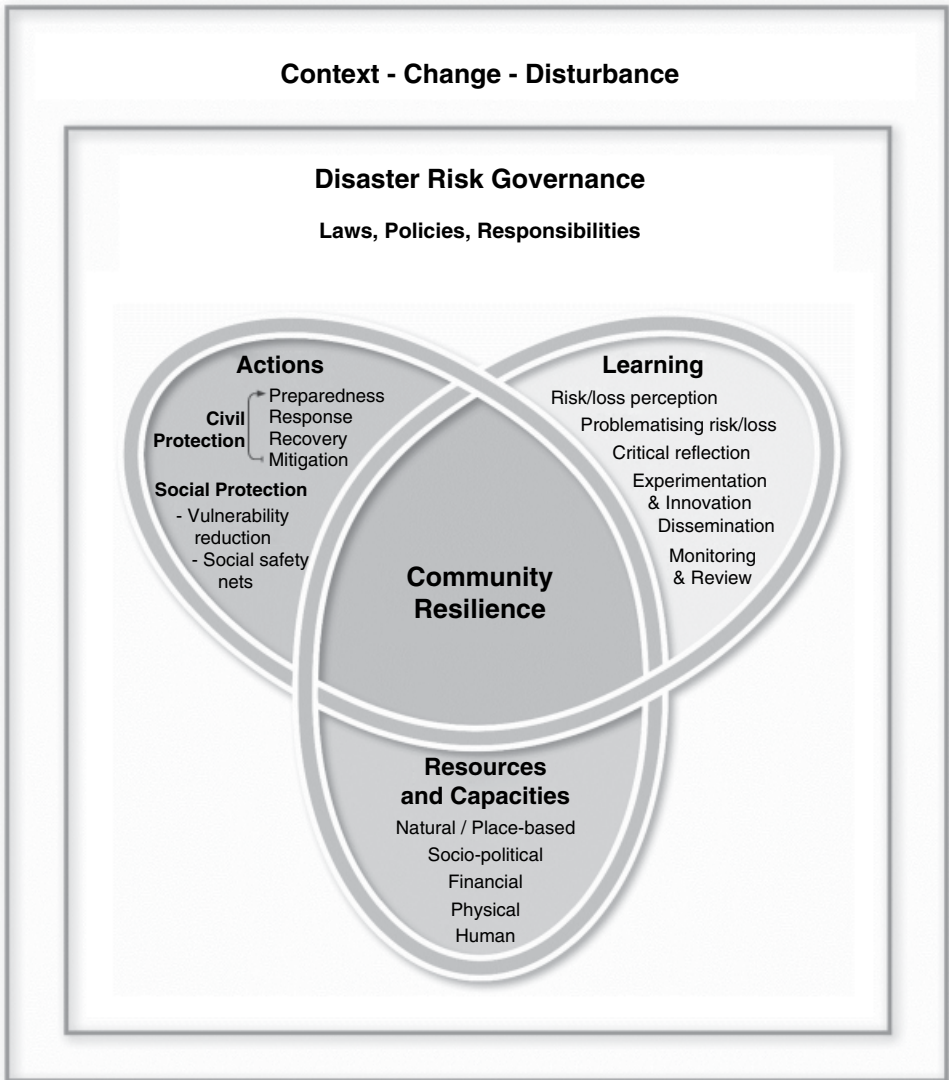


Figure 6.1 The emBRACE resilience framework for community resilience to natural hazards.

can also refer to cultural and/or heritage resources, to local public services, amenities, and to the availability of access to jobs and markets.

Sociopolitical capacities and resources account for the importance of political, social, and power dynamics, and the capacity of community members to influence political decision making. Here, institutions such as the rule of law, political participation, and accountability of government actors are of critical importance. Participation in governance can be both formal, for example through elections, and informal, for example through interest representation in political decision making. Structural social resources are also inherited within the structural and cognitive components of social capital (Moser and McIlwaine 2001), such as networks and trust. Social capital refers to lateral

relationships between family, friends, and informal networks but also to more formal membership in groups, which may involve aspects of institutionalisation and hierarchy. Cognitively defined trust relationships can assist in collective action and knowledge sharing, and thus seem integral to the development and maintenance of community resilience (Longstaff and Yang 2008). Operating within the framework's disaster risk governance domain, however, it should be acknowledged that mutual social trust relationships – as might be expressed between community members – can be differentiated from 'trust in authority' wherein hierarchical power differentials introduce an element of dependency to the relationship (Szerszynski 1999).

Financial capacities and resources refer to monetary aspects of disaster resilience. This includes earned income, pensions, savings, credit facilities, benefits, and, importantly, access to insurance. The role of financial capacities raises questions about the availability of and access to individual and public assets, and about the distribution of wealth across social collectives. The causal relationships that underpin the role of financial resources for community resources are not linear. Increases in available financial resources are not necessarily beneficial for community resilience, for example, if income inequality is high and financial resources are concentrated in a very small and particular segment of society.

Physical capacities and resources for community resilience include adequate housing, roads, water and sanitation systems, effective transport, communications, and other infrastructure systems. This can also refer to the availability of and access to premises and equipment for employment and for structural hazard mitigation (at both household and community scales).

Finally, human capacities and resources focus at the individual level, integrating considerations such as sex, age, race, health and well-being, education, and skills and other factors affecting subjectivities. Psychological factors are also accounted for here, with factors such as self-efficacy, belonging, previous hazard experience, coping capacities, and hazard awareness included. These factors together can be understood to impact on individuals' perceptions of risk and resilience but are also enablers of the community-based leadership that drives collective action.

Sociopolitical (e.g. good governance, specific disaster legislation, supervision of the implementation of legislation, co-ordination and co-operation, being a civic society, having mutual trust, having moral and cultural traditional values, etc.) and human (e.g. gender, income, education, and personality characteristics, etc.) resources and capacities were the most pronounced ones obtained from our case studies (see Chapter 15).

One of the participatory workshops where an earlier version of the framework was discussed with local stakeholders (in northern England) revealed that for the participants, social-political as well as human capacities and resources were most important for characterising their community resilience. Indicators measuring, for example, out-migration and in-migration as well as willingness to stay in the region and engage in associational activities were proposed to describe the degree of community spirit and solidarity that was considered to be crucial for community resilience in a region that is threatened by population loss and demographic change.

6.4.1.2 Actions

Within the emBRACE resilience framework, community resilience comprises two types of actions: civil protection and social protection. The civil protection actions

refer to the phases of the disaster risk management cycle, including preparedness, response, recovery, and mitigation (Alexander 2005). Resilience actions undertaken by the community can be related to these phases (e.g. weather forecasting and warning as preparedness action). Accordingly, civil protection focuses on hazard-specific actions. We add to this social protection considerations, which include hazard-independent resilience actions such as measures of vulnerability reduction and building social safety nets (see Figure 6.1). Social protection action includes diverse types of actions intended to provide community members with the resources necessary to improve their living standards to a point at which they are no longer dependent upon external sources of assistance (Davies et al. 2008). Social protection has been included as a main component because many resilience-building actions cannot be directly attributed to civil protection action but are, rather, concerned with the more general pursuit of well-being and sustainability (Heltberg et al. 2009; Davies et al. 2013). For example, the presence of an active community-based voluntary and/or charity sector capable of providing social support (e.g. foodbanks) and funding for participatory community endeavours (e.g. a community fund), and which could be extended or expanded in times of acute, disaster-induced, community need, was found to be a factor that provided a certain level of security for all those affected by hazards, either directly or indirectly (Dynes 2005).

Such social protection measures are not, however, delivered solely by the community and voluntary sector, so it is important to understand that these elements also relate to the much broader provision of welfare services (health, education, housing, etc.), which are ultimately the responsibility of national and local government. The inclusion of social protection as a main component of this domain, therefore, represents an important progression over some other frameworks, because it explicitly includes the consideration of how communities manifest resilience through both their capacity to deal with and adapt to natural hazards and also their capacity to contribute equitably to reducing the wider livelihood-based risks faced by some, if not all, of their membership.

Social support mechanisms are also particularly important across neighbouring communities (e.g. in northern England, from hill farmers to town dwellers in the aftermath of a flood event) (see Chapter 12). Key considerations were that despite evidence of learning and adaptation that had occurred between two floods in 2005 and 2009, the sheer magnitude of the latter event effectively discounted the effects of any physical mitigation and civil protection measures that had been introduced. Where non-structural measures, such as community emergency planning, had been adopted, there were significant improvements in the levels and success of response activity. However, while these actions reduced some consequences (e.g. fewer vehicles flooded), where properties were inundated significant damage still resulted. Accordingly, the importance of emergent community champions who were capable of advocating community outcomes and the need for community spaces (e.g. groups or buildings) where those affected could learn by sharing experiences and deliberating plans proved to be key factors in driving the recovery, as well as the concurrently occurring future mitigation efforts. The fact that much of the support in the aftermath of the flood events was coordinated by particular officers from the statutory authorities, whose 'normal' roles and skills were social rather than civil protection orientated, itself emphasised the importance of understanding resilience in framework terms, as a practice-encompassing process rather than as a simple measure of hazard response capability.

6.4.1.3 Learning

Learning is the third integral domain that shapes intracommunity resilience in the emBRACE framework. We attempt to provide a detailed conceptualisation of learning in the context of community resilience (see Chapter 4). We follow the notion of learning that may lead to a number of social outcomes, acquired skills and knowledge building, via collective and communicative learning (Muro and Jeffrey 2008). Learning occurs formally and informally, often in natural and unforced settings via conversation and mutual interest. Further, learning is said to be most successful when the practice is spread from person to person (a.k.a. 'social learning') (Reed et al. 2010) and embedded in social networks (McCarthy et al. 2011). In this understanding, learning is an ongoing, adaptive process of knowledge creation that is scaled up from individuals through social interactions fostered by critical reflection and the synthesis of a variety of knowledge types that result in changes to social structures (e.g. organisational mandates, policies, social norms) (Matyas and Pelling 2015). Based on this understanding, we conceptualise learning as consisting of different elements from the perception of risks or losses, its problematisation, to the critical reflection and testing/experimentation in order to evolve new knowledge which can be disseminated throughout and beyond the community enabling resilience to embed at a range of societal levels (see Figure 6.1). The first element, risk and loss perception, grasps the ability of any actor, organisation, or institution to be aware of future disaster risk or to feel the impact of a current or past hazard event. Awareness can be derived from scientific or other forms of knowledge.

Second, the ability to problematise risk and loss arises once a threshold of risk tolerance is passed. A problematisation of risk manifests itself as the perception of an actor that potential or actual disaster losses or the current achieved benefit to cost ratio of risk management are inappropriate. This includes procedural and distributional justice concerns and has the potential to generate momentum for change.

Third, critical reflection on the appropriateness of technology, values, and governance frames can lead to a questioning of the risk-related social contract of the community. Critical reflection is proposed as a mechanism through which to make sense of what is being learned before applying it to thinking or actions.

Fourth, experimentation and innovation refer to the testing of multiple approaches to solving a risk management problem in the knowledge that these will have variable individual levels of success. This can shift risk management to a new efficiency mode where experimentation is part of the short-term cost of resilience and of long-term risk reduction. In this context, innovation can be conceptualised as processes that derive an original proposition for a risk management intervention. This can include the importing of knowledge from other places or policy areas as well as advances based on new information and knowledge generation.

Fifth, dissemination is integral for spreading ideas, practices, tools, techniques, and values that have been proved to meet risk management objectives across social and policy communities.

Sixth, and finally, monitoring and review refers to the existence of processes and capacity that can monitor the appropriateness of existing risk management regimes in anticipation of changing social and technological, environmental, policy, and hazard and risk perception contexts. The Turkish case study on earthquakes revealed that an earthquake experience in one region of the country led to learning mostly by the state

and the adoption of new legislation and new organisation for disaster risk management. Such an experience seems to have very robust effects on attitudes towards disasters, changing the focus from disaster management to disaster risk management (Balamir 2002). The same change process seemed to apply to individuals as well, although to a smaller extent, in that an earthquake experience led to an increase in hazard awareness, preparedness, and purchase of earthquake insurance (see Chapter 15).

The Italian case study in the alpine village of Badia focuses on the perception of risks and losses as one element of resilience learning. The findings reveal that even though people living in Badia have high risk awareness, many did not expect and prepare for a manifesting event. The interpretation of the different risk behaviour profiles shows that people who perceive themselves as at risk of future landslide events had either personally experienced a landslide event in the past or had participated in the clean-up work after previous landslide events. Results of comparing the two groups of inhabitants affected/not affected by a previous landslide point in the same direction, showing that personal experience, not only recently but also in the past, together with active involvement in the response phase lead to a higher risk perception, especially when thinking about the future (see Chapter 13).

6.4.2 Extracommunity Framing of Community Resilience

6.4.2.1 Disaster Risk Governance

In the proposed characterisation of community resilience with respect to natural hazards, the tripartite domains – resources and capacities, actions, and learning – are embedded in two extracommunity frames. The first frame is that of formal and informal disaster risk governance, which comprises laws, policies, and responsibilities of disaster risk management at the local, regional, national, and supranational levels. From the case study research, it became clear that community resilience and its constituent resources and capacities, action, and learning processes are strongly interacting with existing formal and informal laws, policies, and responsibilities of civil protection and risk management more generally (e.g. flood mapping as per the German National Water Act and the EU Flood Directive). Responsibilities in this sense can, therefore, refer to the formal statutory duties or to the informal moral or social expectations placed by society on the actors and stakeholders involved in disaster risk management.

Relating the wider ideas of risk governance to the specific context of a community involves a focus on the interaction between communities' resources and capacities, and actions as well as their learning processes to the specific framework by which responsibilities, modes of interaction and ways to participate in decision-making processes in disaster risk management are spelled out. The 'responsibilisation' agendas in the two case studies in Cumbria, England, and Saxony, Germany, may serve as an example. In both case studies, community actions are being influenced by the downward-pressing responsibilisation agenda, which is encompassed for example within Defra's 'Making Space for Water' strategy for Great Britain and Saxony's Water Law in Germany, the latter of which obliges citizens to implement mitigation measures. This explicitly parallels Walker and Westley's (2011) call to 'push power down to the local community level where sense-making, self-organization, and leadership in the face of a disaster were more likely to occur if local governments felt accountable for their own responses' (p. 4). The case study work showed that this relates not only to local governments (Begg et al. 2015;

Kuhlicke et al. 2016) but also to the individual citizens potentially affected by natural hazards (Begg et al. 2016).

The acknowledgement of an overarching disaster risk governance context also allows comparisons to be drawn between communities that comply with civil protection doctrine, by acting in some way, but who employ different adaptive (or maladaptive) options whose risk management outcomes may differ as a result. In other words, in order to understand the importance of any community's risk assessment, management, and reduction processes as factors in defining that community's resilience, it becomes important to identify how communities 'add value' to any existing standardised and/or legislated doctrine (e.g. in the UK, the statutory duty on all designated Category 1 responder organisations to collaborate). Taking this approach, we see more clearly that an indicator of a particular community's resilience is unlikely to be the existence of a national or county-scale risk assessment process and output, but whether or not the community itself conducts an additional layer of community-context specific disaster risk management activities.

6.4.2.2 Non-Directly Hazard-Related Context, Social-Ecological Change, and Disturbances

As a second extracommunity framing, we consider three dimensions as influential conditions for community resilience: first, the social, economic, political, and environmental context; second, social, economic, political, and environmental change over time; and third, diverse types of disturbances.

The first dimension of non-hazard-related conditions for community resilience is the social, economic, political, and environmental/biophysical context. This includes contextual factors and conditions around the community itself, requiring the expansion of the analysis of community resilience outward to take into account the wider political and economic factors that directly or indirectly influence the resilience of the community. In different concepts and theories, these contextual factors have been addressed, for example in institutional analysis (Ostrom 2005; Whaley and Weatherhead 2014), common pool resource research (Edwards and Steins 1999) or socio-ecological systems research (Orach and Schlüter 2016).

The analysis of contextual factors can also expand backward in time and include an analysis of change over time. Therefore, apart from the more or less stable context factors, we include as another element social, economic, political, and environmental change over time as an influencing force of extracommunity framing of community resilience. Disaster risk and hazard research scholars (Birkmann et al. 2010) as well as policy change scholars (Orach and Schlüter 2016) have identified different dynamics and types of change from gradual, slow-onset change to rapid and abrupt transformation, from iterative to fundamental changes. This can include social change, economic change, and policy change as well as changes in the natural environment, for example connected to climate change and land degradation.

Considering the third condition, a broad variety of disturbances can influence the community and its resilience partly closely interlinked with the perceived or experienced changes and the specific context factors. As noted by Wilson (2013), disturbances can have both endogenous (i.e. from within communities, e.g. local pollution event) and exogenous causes (i.e. outside communities, e.g. hurricanes, wars) and include both sudden catastrophic disturbances (e.g. earthquakes) as well as slow-onset disturbances

such as droughts or shifts in global trade (for a typology of anthropogenic and natural disturbances affecting community resilience, see Wilson 2013). In line with Wilson, we conclude that communities are never ‘stable’ but continuously and simultaneously are affected by and react to disturbances, change processes, and various context factors. Therefore, disturbances can not only have severe negative impacts on a community but can also trigger change and transformation that might not have activated otherwise. As a result, in empirical applications a clear-cut differentiation between contextual change over time and slow-onset disturbances or disturbances that trigger change is not always possible.

6.5 Discussion and Conclusion

6.5.1 Interlinkages between the Domains and Extracommunity Framing

Considering the intertwined components of the proposed tripartite framework, research can be guided by acknowledging the complexity of the possible interactions between the resources and capacities, learning, and actions domains in shaping community resilience at the local level and by recognising that the whole is located within further levels of context which include time. Therefore, efforts to evaluate these multiple levels, their interactions, and how they operate in different contexts for different hazards can provide an enriching evaluation of community resilience. Examples of how the emBRACE framework of community resilience can be used in practice can be found in the emBRACE case studies.

6.5.2 Application and Operationalisation of the Framework in Indicator-Based Assessments

The emBRACE framework for community resilience was iteratively developed and refined based on the empirical research of the specific local-level systems within the five case studies of emBRACE, so is strongly supported by local research findings on community resilience. It was mainly developed to characterise community resilience in a coherent and integrative way but it can also be applied for measuring resilience and thus is a heuristic to be operationalised as an indicator-based assessment. Thus, the framework provides one possible – but empirically legitimised – structure and route to select and conceptually locate indicators of community resilience. This work is described in Chapter 10.

Within the emBRACE project, we derived case study-specific community resilience indicators as well as a set of more concise, substantial indicators that are generalisable across the case studies but which are all relatable to this framework.

6.5.3 Reflections on the Results and emBRACE Methodology and Limits of the Findings

The proposed three-layered and tripartite framework for characterising community resilience is developed deductively by considering theoretical approaches of resilience from various disciplinary backgrounds and state of the art research; it is also developed

inductively based on empirical insights from our case study work. The result is a theory-informed heuristic that guides empirical research as well as practical disaster management and community development. The framework is at once informed by the emBRACE case studies and associated research but also is seen playing out and being implemented through them.

Research does not necessarily include all domains and elements but often focuses on some specific domains and their interaction in more detail. Academic research, in particular, tends to shy away from overly complex solutions. Policy and decision makers at a governance level often tend to seek what might be considered rather one-dimensional solutions but practitioners and community members themselves are well aware of the complex nature of the issues facing them – they see ‘reality’ in this framework. When guiding disaster management and community development, the framework helps to highlight the importance of the multiple factors that are related to community resilience. Whether the framework informs scientific or more practical applications, in most cases it is necessary to adapt the framework to the specific context to which it is applied, for example, cultural background, hazard types or the sociopolitical context.

Nevertheless, it is developed as a heuristic device, that is, a strategy based on experience and as an aid to communication and understanding, but the framework is not offered as being optimal or perfect. It is an oversimplified heuristic but maybe that is what makes it useful as a ‘boundary object’; its very oversimplification allows it to be recognised by community members but also to be interpreted by people operating in – or out of – the other two contexts. Finally, of course, the framework should be subject to ongoing research both for further conceptualising community resilience and applying and specifying the framework in various contexts of community resilience.

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