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Social Learning and Resilience Building in the emBRACE framework

Deliverable 4.3

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Short Description: This report explores how the challenges faced by communities at risk from environmental hazards might be tackled via the application of social learning practices. By outlining the theoretical framework for social learning a better understanding of its application for developing resilient communities is been proposed. The mechanisms for triggering social learning are then outlined, with examples from flood and heat wave risk in the UK employed to highlight how this might be achieved. Gaps and further opportunities for learning and research are outlined, again supported with examples from the UK and Turkey. This provides context for enhancing understandings of the utility of social learning. Most notably, as a way of evolving resilience discourse and practice in order to mitigate the potential and manifest consequences of the disaster risks posed by environmental hazards, by adapting to changes, understanding the wider context and bouncing forwards.

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Cover image: History Wall indicating stage height of 2009 flood (2.44m), Cockermouth, Cumbria UK. ©Maureen Fordham

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About emBRACE

The primary aim of the emBRACE project is to build resilience to disasters amongst communities in Europe. To achieve this, it is vital to merge research knowledge, networking and practices as a prerequisite for more coherent scientific approaches. This we will do in the most collaborative way possible.

Specific Objectives

- ⇨ Identify the key dimensions of resilience across a range of disciplines and domains
- ⇨ Develop indicators and indicator systems to measure resilience concerning natural disaster events
- ⇨ Model societal resilience through simulation experiments
- ⇨ Provide a general conceptual framework of resilience, tested and grounded in cross-cultural contexts
- ⇨ Build networks and share knowledge across a range of stakeholders
- ⇨ Tailor communication products and project outputs and outcomes effectively to multiple collaborators, stakeholders and user groups

The emBRACE Methodology

The emBRACE project is methodologically rich and draws on partner expertise across the research methods spectrum. It will apply these methods across scales from the very local to the European.

emBRACE is structured around 9 Work Packages. WP1 will be a systematic evaluation of literature on resilience in the context of natural hazards and disasters. WP2 will develop a conceptual framework. WP3 comprises a disaster data review and needs assessment. WP4 will model societal resilience. WP5 will contextualise resilience using a series of Case studies (floods, heat waves, earthquakes and alpine hazards) across Europe (Czech Republic, Germany, Italy, Poland, Switzerland, Turkey and UK). WP6 will refine the framework: bridging theory, methods and practice. WP7 will exchange knowledge amongst a range of stakeholders. WP8 Policy and practice communication outputs to improve resilience-building in European societies.

Partners

- ⇨ Université catholique de Louvain (UCL) - **Belgium**
- ⇨ University of Northumbria at Newcastle (UoN) - **UK**
- ⇨ King's College London (KCL) - **UK**
- ⇨ United Nations University Institute for Environment and Human Security (UNU-EHS), **Bonn**
- ⇨ Accademia Europea per la Ricerca Applicata ed il Per-fezionamento Professionale Bolzano (EURAC) - **Italy**
- ⇨ Helmholtz-Zentrum Fuer Umweltforschung GMBH - UFZ (UFZ) - **Germany**
- ⇨ University of York (SEI-Y) - **UK**
- ⇨ Stockholm Environment Institute - Oxford Office Limited (SEI-O) - **UK**
- ⇨ Swiss Federal Institute for Forest, Snow and Landscape Research - WSL (WSL) - **Switzerland**
- ⇨ Middle East Technical University - Ankara (METU) – **Turkey**
- ⇨ University of Reading (UoR) - **UK**

1. Table of Contents

1. Introduction

The challenges presented to society by environmental hazards today are more complex than in the past and require new approaches to problem solving. Resilience requires particular change, and its careful management, to help living standards be maintained or transformed in face of a disaster, both in the short and long run. The emBRACE project is concerned with ***community resilience***, and we take our definition of resilience from the latest Intergovernmental Panel on Climate Change (IPCC) summary report as being:

> "The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation" (IPCC, 2014).

This definition closely links resilience with the capacity to adapt, where adaptive capacity refers to the aspect of resilience that reflects learning, flexibility to experiment and adopt novel solutions, and development of a generalized response to broad classes of challenges. This report proposes that social learning can potentially be employed to help prompt this required change in order to build resilience. Social learning has been defined in many ways but has evolved over time from being specifically about individual learning taking place in a social context, to be recognised as a, critical aspect to achieve sustainability in the context of social-ecological change (Armitage 2005, Diduck 2010) ecological sustainability (Reed et al, 2010 climate change adaptation (Pelling et al, 2015, May and Plummer 2011, O`Brien and Keefe, 2013), and resilience (Pelling, 2011, Krasny et al. 2010:) narratives and practice. Today researchers are engaging in social learning inquiry from many different perspectives including environmental education (Wals 2007), and natural resource management (Muro and Jeffrey 2008, Mostert et al, 2007, Pahl-Wostl et al, 2006, 2007, 2009).

The idea behind this suggested approach to social learning in the context of community resilience is that through facilitated social learning, knowledge, values and action, competences can develop in harmony to increase a group's capacity to build disaster resilience. Shared learning amongst peers is believed to facilitate faster

and deeper learning compared to that received through the dissemination of an instructor only (Joiner, 1989; Elwyn et al., 2001). This results in the potential for informal communities of practice functioning as vehicles for peer learning, facilitating resilience building (Pelling, 2008). Accompanying this potential are a number of practical questions: How can the dissonance created by introducing new knowledge, alternative values etc., become a stimulating force for learning, creativity and change? How can people transcend social norms and personal biases in order to enhance the flexibility of the social-ecological system and its ability to respond to change?

It is possible that this dissonance may be bridged by allowing for and encouraging reflective practices that can lead to transformative learning, which is defined as leading to a change in an individuals' frame of reference, with potential consequences on the individual's behaviour (Mezirow, 1991, 1995, 1996; Cranton, 1994, 1996). Frames of reference are defined as mental structures through which individuals make sense of personal experiences and that predetermine a person's cognitive, emotional and behavioural responses to new experiences – in other words, filters that "shape and delimit our perception, cognition and feelings by predisposing our intentions, beliefs, expectations and purposes" (Mezirow 2006,p.26, cited in Vulturius and Gerger Swartling, 2013). It is proposed that through social learning it is possible to move beyond knowledge transfer (which may well be out-dated or unsuitable for general use) towards learning that evolves with the input of various actors (including those at community level), is adaptable and is able to reflect on what is effective as it develops. If successful, this type of learning should lead to communities that have evolved to be flexible, adaptive and strong enough to bear future shocks. This should be what is taken by the term resilience. It should not be an end state or goal but a desirable process through which communities of practice become confident and competent at identifying, analysing, reflecting and adapting their own schema of understanding and practices for living in an uncertain world.

Having said this, it is also recognised that there are resource constraints to such practices such as time, finances and human resources and so on. As a consequence, a working heuristic framework is required in order to allow resilience to be framed in a pragmatic way that allows for the development of learning over time, but not at the expense of current needs or concerns. The following graphic (figure 1) illustrates how community resilience is dependent upon learning (along with resources and capacities and appropriate effective actions), in maintaining essential

functions in communities exposed to or affected by hazards. Of particular interest for this report is how learning is defined here to include phases that examine perceptions of risk and loss whilst also highlighting the importance of experimentation and innovation. Critical reflection is proposed as a mechanism through which to make sense of what is being learned before applying it to thinking or actions. As a consequence, although transformational learning may hold promise for the future development of community resilience it is bounded in this conceptualisation by the presentation of resilience as a form of maintenance. This perspective holds that developing resilience to future threats is still an abstract concept as the cycle is currently reactive rather than proactive, principally because the resources and capacities required to react to current threats are stretched due to financial contraints in the prevailing economic climate. This social learning framework, developed as part of the emBRACE project, attempts to address these realities while acknowledging social learning outcomes as potential elements of transformation and change that are desirable for adapting to and living with future disaster threats.

1a

Figure 1a-1b: The emBRACE framework of community resilience in the face of disaster impacts (detail and full context).

This report reviews the literature and case studies in the field of social learning and resilience, as well as the broader fields of social learning in the context of resource management and climate change adaptation, in order to begin to address the following research questions:

- To what extent can social learning contribute to resilience building? And if so how?
- How far does it contribute to existing gaps in the resilience literature?
- What are the mechanisms for instigating social learning for building resilience?

- What are some challenges that need to be overcome?
- What are the limits of social learning for building resilience?
- How can we begin to measure the effectiveness of social learning for building resilience?
- What are the research needs?
- What are challenges concerning social learning when dealing with natural hazards?
- What capacities are needed for social learning to build resilience in the field of natural hazards?
- What does social learning mean in the context of community resilience?

2. What is Social Learning?

Over the past decades, the concept of social learning has attracted wide attention in the scientific debate, generating rich models of concerted action, collaborative inquiry and learning for sustainability (Diduck 2010). Social learning has been highlighted as particularly relevant for addressing the complexity of adaptation processes involving multiple actors on different scales and with different perspectives (Hinkel et al. 2010). The concept of social learning as "a process of collective and communicative learning, which may lead to a number of social outcomes, new skills and knowledge" (Muro and Jeffrey 2008:330) is a frequent entry point to learning in the context of environmental issues.

The sociological perspective of social learning moves beyond the idea that individuals learn in a social context. Bandura (1971, 1986, 1991), presented a psychological outlook to learning within social structures, such as organizations or institutions. McCarthy et al. (2011) summarise various definitions of social learning by referring to the concept as an on-going, adaptive process of knowledge creation that is scaled-up from individuals though social interactions fostered by critical reflection and the synthesis of a variety of knowledge types that result in changes to social structures (e.g. organizational mandates, policies, social norms).

While recognising the many different perspectives and diversity of approaches to social learning (Gerger Swartling et al., 2011), this report adopts Reed et al's (2010) well-crafted definition of social learning as learning that goes beyond the individual, to be embedded within social networks. These networks can be within a household, a

friendship group, a village or town, an organisation or at a more regional or global community scale. However, it is important to note that collective learning is not the linear sum of individual learning. Therefore, a successful mass media campaign that achieved a societal change in understanding about resilience could not be considered social learning unless the message also spread from person to person through social networks (Reed et al, 2010).

2.1 The process: Loop Learning

Research on the processes and ways in which learning in social-ecological systems unfolds concentrate on only a few heuristics while other mechanisms remain largely unaddressed. While the notion of loop-learning, for example, has received lots of attention (Lebel, Grothmann and Siebenhuener 2010; Tschakert and Dietrich 2010), fewer studies address experimentation as a mechanism for learning. Issues like diffusion, and convergence, which have contributed considerably to understanding learning processes in the social sciences, have not been studied in the context of resilience research so far and represents a critical research gap.

Research on learning processes in social-ecological systems lends much of its heuristics from organizational theory, and organizational learning, in particular. The arguably most influential research on organizational learning introduced the notion of loop-learning (Argyris and Schön 1978), which continues to influence studies on learning as a factor in resilient social-ecological systems. Other related distinctions of learning in the literature are technical, conceptual, and paradigmatic learning (Van de Kerkhof and Wieczorek 2005) and first-order, second-order and third-order learning (Bennett and Howlett 1992) (cited in Gerger Swartling et al, in press, 2015).

The theory of loop-learning differentiates from learning according to the depth of critical reflection they trigger. Single-loop learning describes the correction and amendment of specific organizational instruments. When single loop learning takes place, alternative strategies are defined to pursue established goals. Double-loop learning challenges these goals and objectives. In a process of double loop learning, fundamental organizational values and policies are adjusted, resulting in profound changes in the behaviour of actors (Argyris and Schön 1996; Flood and Romm 1996). In the environmental and resource management literature, the notion of organizational loop-learning has been extended by the possibility of triple loop learning (Flood and Romm 1996; King and Jiggins 2002; Keen 2005). This form of

learning is concerned with governance norms and protocols that predicate single and double loop learning. The learning process thus affects the underlying governance system and critically challenges the role of human agency in individual and collective learning processes. As McCarthy et al. (2011) point out, triple-loop learning positions the learning processes within a political context and introduces the notion of power.

The concept of loop learning is strongly reflected in studies on resilience of social-ecological systems, in particular those that draw on the adaptive cycle as a heuristic tool to highlight gradual processes of transformation (Lebel, Grothmann and Siebenhuener 2010; Tschakert and Dietrich 2010). Reflecting on the explanatory power of the adaptive cycle for global changes, Holling (1986, 2004) differentiates three types of learning: incremental front loop learning, spasmodic back loop learning, and transformational learning. According to Holling, the first two phases of the adaptive cycle, entrepreneurial exploitation and organizational consolidation, describe a pattern of growth that forms the forward loop. Here, a gradual accumulation of skills and techniques can be observed. Following this, the phases of creative destruction and restructuring form the rather unpredictable, rapid back loop, which tests formerly accumulated system characteristics. Finally, Holling highlights a third, more profound way of learning which has the potential to fundamentally transform system strategies and processes. This ultimate form of learning is likely to occur in situations where change is essential and a system is highly vulnerable, e.g. after a major shock. The influences of Argyris' and Schön's theory of organizational loop learning on the adaptive cycle are apparent in Holling's studies.
Phases of front-loop learning and spasmodic back loop learning can be observed on all scales of a social-ecological system and are strongly related with each other. This notion of nested, interacting cycles across spatial and temporal scales is essential for understanding the adaptive cycle and learning processes as part of resilience. Holling differentiates between slow and fast cycles and large and slow cycles and points out that creative destruction and re-organization in small cycles can inform the generation of new ideas and concepts in larger cycles. At the same time, front-loop learning through organizational consolidation in higher cycles can provide a memory that affect back-loop learning at lower scale cycles (Holling 2004).

The notion of loop-learning in social-ecological systems has been incorporated in recent studies that present more advanced accounts of social learning as an element of resilient social-ecological systems. McCarthy et al. (2011), for example, outline

what they call a “Social Ecological Epistemological” (SEE) systems model of social learning, which provides guidance on how to conceptualize and assess learning. As in the case of Holling (2004), their model reflects the strong influence of organizational learning theory on resilience research, as loop learning is an integral element of their framework. The three loops are perceived to capture different levels of critical reflection within a social-ecological system, and the authors stick closely to the definitions of each loop indicated above. The added value of the study of McCarthy et al. is their incorporation of both different types of knowledge that inform social learning and different scales at which social learning can take place. Differentiating between governance, scientific, and local knowledge on the one hand, and national, regional, and individual scales on the other, the author’s present a triangle of learning in resilience which can be used to map and assess the generation of novel ideas (McCarthy et al. 2011).

But what counts as ‘learning’ in this context? Learning can be thought of as retaining additional knowledge. Studies that perceive resilience as an outcome often highlight the necessity to develop ***adaptive capacity*** (Pelling et al. 2008,). In these studies, social learning is perceived as the process to develop this capacity. What is being learned is thus the capacity to live with uncertainty and risk. However, perceptions of capacity, risk and resilience will be different. For instance some communities/individuals may perceive community resilience as being the innate community ability (capacity) to deal with vulnerability and risk (i.e. psychosocial ability) while others will see it as the transformative capacity (or action ability) to do things differently to mitigate/prepare. But b*oth* are important: the ability to *think* resilience and the ability to ***do*** resilience.

However, some literature suggests that for social learning to lead to resilience there has to be a ***change in behaviour*** (Ison et al 2000). Both are important, however as the ability to be able to think about, process and develop attitudes and behaviours are linked to an improved self-efficacy (belief in one’s ability to do something e.g. Bandura, 1997) which in turn allows individuals and communities to take the steps towards action to improve their resilience. This can include a proactive change in habits or actions (such as buying new equipment; moving home; organizing things differently; and so on) or a softer change in behaviour such as staying indoors during a heatwave. One the other hand, one could argue that in the case of resilience or climate change adaptation, the only useful form of learning is one that leads to a change in value as this will ensure that sustainable changes occur in the long term

perspective required for resilience. In this report we will take learning to include all these subsequent changes, whether it is a change in behaviour, habits, practices, or values.

2.2. What is the relevance of Social Learning to building resilience?

Learning is considered an integral element of resilience of social-ecological systems and features prominently in influential definitions of the concept (Berkes, Colding and Folke 2003; Folke 2006). The development of **adaptive capacity** is critical to resilience in social–ecological systems (Armitage 2005), where adaptive capacity refers to the aspect of resilience that reflects learning, flexibility to experiment and adopt novel solutions, and development of a generalized response to broad classes of challenges (Walker et al. 2002). Two of the key dimensions of adaptive capacity are learning with uncertainty and combining different types of knowledge for learning (Armitage 2005). Further, the concept of community resilience lends itself to being considered as not simply a property that is invested in individuals but also, potentially, as a property of the entire social network (e.g. a community of resilience practice: Deeming et al., 2015). This is why learning that extends throughout social networks, going beyond just the individual, can be an essential tool in increasing resilience (Newig et al, 2010). Furthermore, in an ever more connected world, individuals or groups in one country can communicate and share knowledge easily with others in another, but currently the forum for this does not exist. The potential for using social media to promulgate concerns and responses to disaster threats at the community level in order to inspire and engage communities is in its infancy and can and should be investigated further. There are already groups of interested parties with wi-fi connected laptops who take part in crowd mapping[1] on behalf of disaster responders after disaster strike, but why not engage with these before-hand? The trans-boundary nature of hazards, has the potential to galvanise communities and nations to share and exploit such technologies, but this is not widely practiced. With climate change resulting in shifting hurricane patterns and the expansion of social exposure to flood hazards, often into areas which have rarely experienced such hazards, it is ever more important to share knowledge across borders.

[1] See: http://libguides.lib.msu.edu/c.php?g=96735&p=629418 for links to websites and papers on this field.

In essence, variables exist that impact the usefulness and appropriateness of the concept and practice of social learning as an approach to build community resilience to disasters which this emBRACE project report is designed to explore.

2.2.1 Resilience to what?

First, one has to ask what ***we want to build resilience to.*** Approaches for building resilience to one type of hazard may not be as appropriate when attempting to build resilience to another hazard type. Based on the recognition for the need for attention, retention, and motivation in diffusion of knowledge (Bandura, 1977), as discussed later in this report, one could argue that social learning could be more useful in building resilience to regularly recurring hazards as experiences will be more permanently lodged in to people's memories. This may enable people to relate information to the situations they have been in and view a motivation to change. On the other hand, there is also the argument that social learning may be more appropriate for building adaptive capacity to high-impacting and out of the ordinary hazards, due to the extreme resonance these events can have with people, cementing memories and resolution for change. However, experience from one emBRACE case study undertaken in a small valley community in the Sud-Tyrol region, where a high frequency of small alpine hazard events are part of everyday life, found that this was not the case. Because people lived with hazards, preparing for and coping with them was embedded in their local culture. Social learning is important for understanding the known hazard threats, which are discussed within the community, families and shared with the young generation. The distinction is not one of regular hazards vs high-impacting hazards but between known hazards such as the current alpine hazards and unknown hazards or "new" hazards such as chemical accident or an electricity blackout. Furthermore long-term learning linked to local knowledge was an important driver of community understanding and preparation, while also enveloped into how organisations learned following high impacting events.

Further, building resilience for multi-hazard-events or multiple hazard conditions might involve different capacities and learning processes than regular or extreme single-hazard events, as most institutions (i.e. organisations, norms, regulations) dealing with hazards focus on single hazards only (Tweed and Walker 2011). The change in hazard exposure and vulnerability due to a changing environment (e.g. land use change, change in public budget, climate change etc) is one of the context-

specific factors resilience building process need to account for. This differentiation is not discussed in the literature and needs further illumination.

2.2.2 Social Learning as a means of becoming resilient

The effectiveness of social learning may vary if the aim is to change immediate habits in line with building resilience, compared to creating long-term lifestyle alteration or perhaps a value change. Changing long-term values may be the culmination of a variety of approaches at a more profound level, not solely through social learning processes. However, social learning can play a critical part in any such process, due to values being closely linked with the norms and practices of others in society. This differentiation across social learning is not acknowledged in the literature and requires further research.

Organisations instigating learning in order to build resilience in the wider community, have done so on the premise that social learning allows the flow of information in a vertical manner from those initiating the learning conversations to the actors below (e.g. Sims and Lorenzi, 1992; Argyris, 1996; Keen, 2005). This predominance would suggest that social learning can be very effective at this scale and perhaps does not so readily occur at others. The literature also suggests that this vertical interaction more commonly occurs rather than horizontally, *within* a community for example. This is beneficial for building resilience as it broadens the 'sphere of influence' of the knowledge allowing for flows between the various levels, where resilience building is both most critical but also where learning has the potential to be moulded and extended with the local insight. However, in discussing how ideas become viral, Gladwell (2000) also points out the impact of influencers on the importance of where this diffusion initiates from. By concentrating on these opinion leaders or 'Mavens' (a term derived from Yiddish to mean 'one who communicates knowledge' (Gladwell, 2000, p. 60) learning, new ideas, cultures and practices may be spread from the bottom up too. This is key to the success of social learning as those with interest in learning and acquiring new knowledge often have the impetus, energy and commitment to evolve the process. It is likely that where the learning is generated and disseminated will most likely have an effect on how the social learning spans networks and therefore how it is taken up and translated into value or behaviour change.

This is also related to the importance of social learning as a driver for improving self-efficacy in tackling hazard threats. Self-efficacy is the belief or confidence in oneself to take action and more importantly, to persist with this action (e.g. Bandura,1997) and is seen as key to allowing the development of confident, self-aware individuals who are more likely to have an internal locus of control when faced with hazard threats, thereby driving them to take action, even only on a personal level; as opposed to those who have an external locus of control and instead rely on others to take action for them such as governments or others agencies that they perceive to be responsible for dealing with hazard threats for instance.

2.2.3. Capacities for Social Learning

Social Learning potential and evolution is only possible if the actors interact with each other and if they are supported by (e.g.) governance institutions, and have access to technology and other resources. It will be particularly essential in the transition to sustainability if it is scaled-up from organizational and community to societal levels. (Sinclair et al., 2008). A core mechanism for enabling social learning to influence and have the potential to change resilience outcomes is the extent to which adaptive capacity is allowed to flourish. Learning capacity (a key component of adaptive capacity) develops when institutions that are adaptive allow for transformation to occur through learning, which includes challenging the dominant paradigms and structures that may have led to stasis up to this point. According to Gupta et al, (2010), when actors are encouraged to learn by adaptive institutions they can go beyond improving routines through single loop learning to experiencing double loop learning, where norms and assumptions are challenged by social actors. However this is reliant on the institution and the actors being freed from prior constraints of fear, practice and reflexes, which may be ingrained and representative of the norm. This is not always easy and so Gupta et al (2010) argue the need for criteria to assess an institutions learning capacity based on:

- Trust of each other.
- Adoption of single loop learning.
- Adoption of double-loop learning.
- Consideration of doubts and uncertainties.
- Stimulation of institutional memory.

(After Gupta et al, 2010)

This is not a finite set of criteria but allows for institutions and actors to understand the process they may need to go through in order to start to adapt. By learning to trust via a process of learning and acknowledgement of prior or current failings, an opportunity is provided for both institutions and actors to learn, reflect and act together, constantly evolving the process beyond a 'business as usual' form of resilience to one that, because of its capacity for evolution, change and adaptability, is able to withstand the shocks from natural hazards.

It is recognised that there may be resistance to such a process, but it is apparent that case studies undertaken under the emBRACE framework provide an opportunity to engage with resistance by providing opportunities for social learning that has been able to adapt institutions and communities into becoming more flexible as they learn each other's needs, capacities and resources

3. Mechanisms for triggering social learning for building resilience

This section details the key components, not to be addressed in any specific order, which can be undertaken by those wanting to initiate a change in behaviour, lifestyle or value with a view to building resilience via social learning. The methodology for using social learning for building resilience is not easily explored in the literature. This is partially due to social learning being part of an evolving process of learning that is borne from social interaction and which is, furthermore, multifaceted in that it happens across several levels of community. However, there are some common, as well as unique mechanisms described within the case studies which will be provided here as launching points. In addition, key actions or considerations will be recommended, produced by identifying shared elements from research and case studies of successful social learning.

Social learning is a cyclical process that depends both on external ideas and intrinsic critical reflection. New ideas, values and norms are developed and disseminate through spatial and temporal scales. They are either rejected or adopted, modified, and reshaped, and can thus contribute to the development of new ideas, thereby evolving the learning cycle. Whether or not novel ideas are predominantly adopted or rejected by other actors has consequences that are highly relevant for the study of

resilience to natural hazards. Governance structures and mechanisms of social-ecological systems can be expected to converge as popular ideas disseminate through networks of actors and are institutionalized across scales. On the other hand, more diverse governance mechanisms can be expected if incoming ideas are largely unpopular, triggering demand and room for innovation, modification and the development of more appropriate structures and policies.

3.1. Communication of information and demonstration of how to make changes

In order for behaviour to be reproduced, an individual must organize his or her responses in accordance with appropriately modelled behaviour. This ability can improve with practice. Finally, there must be an incentive or motivation driving the individual's reproduction of the behaviour, which is why it is important that risks from hazards to the individual are personalised and made relevant (McClure, 2006).

This also illustrates a fundamental dichotomy between the two different approaches to behaviour change: one that needs a stimulus i.e. 'education' and one that provides its own stimulus via curiosity of the individual (e.g. Gladwell, 2000). In the former, learning is based on closing a knowledge deficit gap. This provides a closed singular loop approach to learning that has a goal to impart knowledge with the hope that enough 'sticks' to the learner. However a learning model which capitalises on an individual's drive to learn, reflect, adapt and to continue learning, provides an open looped approach. This exerts greater influence through the learning experience, having the potential to propagate transformative learning while allowing greater self and group-efficacy to develop; which will enable individuals and communities to be undeterred by obstacles, including hazard impacts, when they occur.

Even if all of the above factors are present, the person is less likely to engage in the behaviour change without motivation (i.e. without a reason to do so). This motivation can be increased if the change in behaviour, lifestyle or value is clearly and directly linked with increasing the individual's resilience to disasters. For example, recent studies have shown that personal experiences with extreme natural events can motivate people to take action to lower the risks from natural hazards (Brody 2009; Albright 2011; Kreibich et al. 2011). Individuals' motivation may therefore more easily be achieved if the particular hazard event has impacted the individuals in the past, even more so if it has impacted them severely or regularly. Figure 2 summarises

some key aspects of the communication if it is to maximise effective application and resulting resilience building.

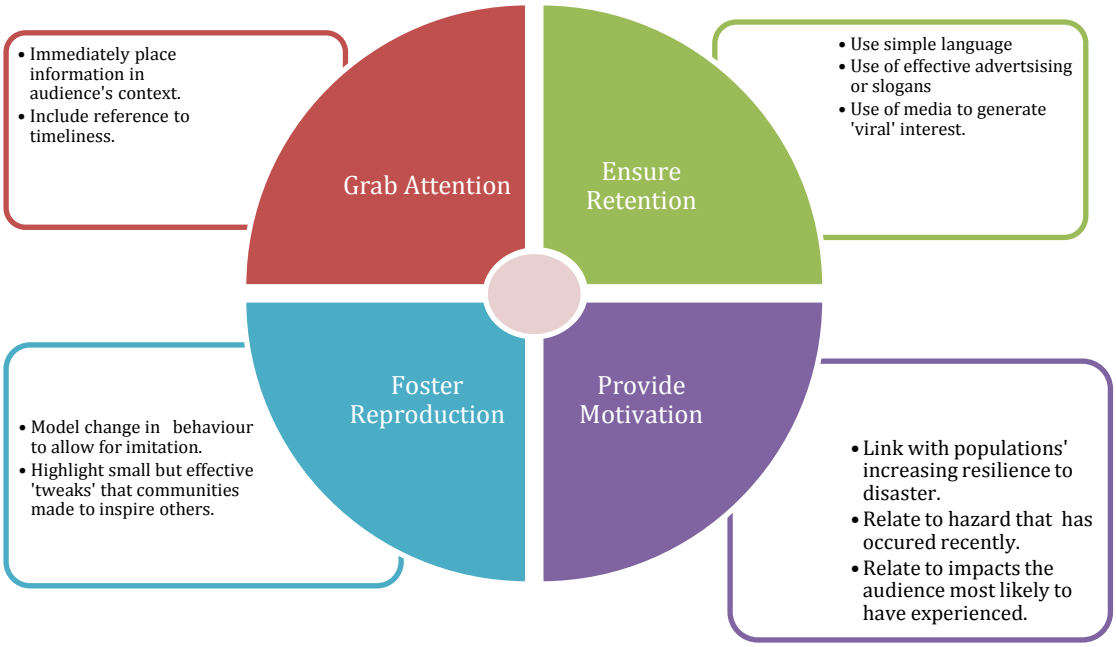

Figure 2: One type of communication (transmission of information) for resilience building

3.2. Learning from whom?

This first component of communication of information and demonstration of change requires the question “learning from whom?” to be asked. The literature on learning in social-ecological systems suggests that complex adaptive management of social-ecological systems (SES) does not require an external source. Central to complex adaptive systems (CAS) is that the agents have agency and can adapt (socially) by interacting, which it can be argued, is also a form of social learning. CAS and SES acknowledge the influence of ‘external drivers’ whereby new knowledge coming into the system would be a driver of social learning within the system.

Although learning can take place as a consequence of self-reflection by individuals and organizations, their inherent connection to the wider social-ecological context means that even the most intrinsic learning processes are, to a certain degree, inspired by external ideas, values and norms. An explicit acknowledgement of this externality highlights the fundamental importance of inter-agent relationships for learning, and raises questions on the complex interplay between knowledge

dissemination and the development of new ideas. This should and must include a mechanism for feedback from individuals, groups and organisations borne from their experience, as a way of starting learning conversations and similarly as a way of returning to these conversations following learning so that a cycle of experience and transformation can be incorporated into project outcomes. This allows for flexibility of process and outcome so that social learning as a process constructs shared experiences, cognitive processing and action along the way to building more resilient individuals and communities as the desired outcome.

This focus on relationships and transfer processes is at the heart of the contribution that diffusion theories can make to the study of learning in social-ecological systems. But diffusion theory only addresses how the information is transmitted: it does not address how that same information is received, adopted and adapted by the target community which is a much more complex process of social-learning-within-the-community-itself. The complex interplay between knowledge dissemination (i.e. transmission) and the development of new ideas (within and by the community) fits well with ideas of loop-learning and feedback mechanisms, which are central elements in both learning theories and resilience thinking.

The mechanisms for this first step can be split into two types, of which there are benefits and weaknesses for each (refs). The first involves a direct dissemination of information and suggestion or instruction for change to one or more other groups. This includes methods such as mass media campaigns, including via television, radio, the internet or paper materials. The benefit of this is its simplicity. ‘Experts’ have generated some knowledge, policymakers have formulated an appropriate change in response to this, and this is then communicated to the public or a specifically targeted audience for them to include in their responses to risks. However, within social learning the communication does not stop with the direct flow or transmission but investigates and seeks to understand how, when, and where other group(s) contribute to the knowledge consolidation, adaptation and adoption. This acts as a way to generate additional knowledge, a way of disseminating it and a way to ensuring increased ownership and therefore high likelihood of groups sharing their collective knowledge afterwards. The majority of these types of cases involve the opinion leaders or mavens disseminating information and demonstrating the desired change with little input from other groups present. Some examples of a slightly higher level of involvement of other parties can be found in Mostert et al (2007), detailing some social learning processes that were aimed at better managing

water resources in a variety of European countries. The Mostert et al (2007) paper notes that most cases studied highlighted the involvement of all major stakeholders as an important aspect of the initial communication process, with many disseminators choosing to communicate the information and desired change to representatives who were responsible for bringing the perspectives of their organisations to the instigators and feeding back the outcomes of the process to their respective institutions. As they developed a sense of belonging to the multi-stakeholder initiative, trust and understanding could develop (Ibid.). It also allowed stakeholders to realise their interdependence and think that participation in the process can yield better results than unilateral action. However, in many of the paper's examples, concerns were raised about the reliance on individual representatives from organisations. This was in terms of the concern that this understanding and trust was not then being transferred to the organisations of the representatives, and that individuals may leave their organizations and therefore leave the process. Another key factor concluded was the importance of the involvement of high level institutions in such communications, not only local level organisations. Inflexibility at the national level often constrained potential for learning at the local level, whereas a case of water management in Hungary is given where national representatives participated in the communication meeting resulting in more sustainable decisions and subsequent better chance of actions being spread along these networks (Ijjas and Botond, 2004). Dougill et al (2006) suggest that early understanding of the social network into which the information is being introduced (e.g. by using social network analysis); allied to creating forums for stakeholders to iteratively interact with information transmitters can help build trust and acceptance on both sides leading to outcomes which are grounded in the reality of local lives and experience.

The case study below details a particularly interesting attempt at social learning as a method for building resilience that follows this format.

emBRACE UK Case Study: North of England Floods: Cumbria

The findings of this case study work are presented in detail in the case study report; Deliverable 5.6 'Floods in Northern England' (Deeming et al., 2015)[2]. In the following section, case-study findings related specifically to the social-learning effects inhered within the community emergency planning processes in Cumbria will be presented.

The North of England Floods case study focussed on the investigation of how 'community resilience' manifests itself along the course of a relatively short, populated, river catchment. The River Derwent in Cumbria stretches approximately 48km, from its source above Borrowdale in the Lake District fells, to its mouth on the coast at the port town of Workington. The population that lives along this catchment range in profile, from hill farmers and village dwellers to the residents of the three towns the river passes through, Keswick, Cockermouth and Workington. It is important, therefore, to understand that any concept of 'community' that is applied to this diverse population will always be relative. One factor that is shared, however, is that in 2009 a large proportion of this population was directly or indirectly affected by a high magnitude flood, which resulted in thousands of properties being flooded across Cumbria, the loss or damage of key infrastructure, the loss of a life of a Police Officer and losses to the economy of up to £100M (Cumbria Intelligence Observatory, 2010). Whilst impacts were felt across the population, this example focusses on the learning that occurred, in relation to one activity that has underpinned improvements in many aspects of resilience in Cumbria; Community Emergency Planning (CEP)

Community Emergency Planning (CEP)

Parts of the Derwent catchment had experienced significant flooding prior to the 2009 event. In Keswick and Cockermouth severe floods in 2005 had led to the formation of Flood Action Groups (FAG), whose members had, through persistent engagement, developed effective working relationships with the county's formal emergency-response and flood-risk management (FRM) agencies. In Keswick the relationship between the FAG and the responder services was so strong that in 2009 the coordinated response this enabled was praised as having significantly reduced flood impacts in the town:

[2] Downloadable: http://www.embrace-eu.org/case-studies/floods-in-northern-england

> "So we were galvanised and we were prepared and the community was engaged and we had a difficult job to do but it was a damn sight easier than it could have been because the work that the Flood Action Group had done made the town very flood-aware. And the work that the Environment Agency, [Laurie T] had done in setting up the Flood Action Group and the publicity that they've had locally, you know we're a community of only about 5,000, but when someone knocked on the door, whether it was a volunteer, Police Office, Fire-fighter, Mountain Rescuer and said 'you're house is going to flood'; when they got their text message alert, they'd be all signed up for it, they were very, very flood-aware, the community, so a lot of property, moveable property was secured and was saved." *Interviewee C13_M_1*

In Cockermouth, the magnitude of the flood was unprecedented, inundating parts of the town, including the main street, to depths of <2.44m. As such, the event directly impacted significantly more people than had previously been affected and a greater range of people than had thus far been represented on the town's FAG. The community's emergency response was, therefore, not as effective as in Keswick, but once the waters had subsided, the FAG committee continued and intensified its engagement with FRM agencies in order assist in the town's recovery and to advocate a strong case of mitigation efforts to be focussed on the provision of structural defences. This recovery-phase advocacy approach was shared in Keswick, where the participatory planning process eventually leading to both towns benefitting from the construction of multi-million pound flood defence schemes.

In Workington, however, where the flood also attained unprecedented magnitude, there had been no FAG in place at all. In the aftermath, residents who had been directly affected were facilitated by a range of Local Resilience Forum (LRF)[3] and 3rd Sector actors in setting up a group. Differently from in the other towns, however, the cost-benefit calculations did not support major investment in structural flood defences, therefore, this group found itself largely planning for how they would respond to a future flood, rather than on engaging in the complexities of securing funding for a major scheme. In the rural areas and less densely populated villages CEP was again offered as an option with small amounts of LRF and other 3rd Sector

[3] Local Resilience Forum: a collective of emergency responders who meet regularly and during emergencies to coordinate and monitor risks and responsibilities at the scale of a police area (i.e. usually county scale in England).

funding. Facilitation of this community planning was undertaken by a local 3rd sector organisation ACTion for Communities in Cumbria (ACT), who worked with the LRF to develop a 10-Step CEP process (ACT, 2012). Here again, because the rural population had found itself dealing with the flood effects largely 'on its own' (King, 2000), the focus was on developing response measures to ensure that vulnerable people were supported during a future event. However, due to the 'resourcefulness' of some of these groups' leadership they were also able to negotiate the implementation of a number of structural or other river management measures to mitigate some risk to their villages. Following its initial success the 10-step plan has been gradually rolled across Cumbria, focussing initially on communities exposed to flood hazards, but increasingly by encouraging a wider all-hazards approach to community planning. The levels of trust achieved between the statutory LRF membership and the community planning groups has even reached a point where, in order to expedite effective response actions, groups with formally validated plans can be contacted directly by the county's Police control room at the outset of any potential emergency.

Key Lessons

By using the learning characteristics adopted in the emBRACE Framework (Figure 1), it can be seen that the FAG-based and 10-Step CEP processes along the Derwent catchment have emanated directly from flood experience. **Risk and loss perceptions** had been raised in Keswick and Cockermouth by the 2005 event, which initiated the FAG formations there. However, it was the sheer magnitude of the 2009 event that further stimulated the Workington and the rural exposed communities to work with the LRF and its partners to develop plans of their own. In some part, in these later adopting (Rogers, 2003) communities in particular, this **problematizing risk** through the promotion of CEP was being encouraged as a way for people to accept that in any repetition of a wide-area emergency they would still most likely need to act in their own best interests. In effect, **critical reflection** following both 2005 and 2009, by all parties, had identified the fact that the limited resources of the formal responders would always be highly committed in the more densely populated areas, so any actions that could be undertaken by communities themselves could literally save lives and reduce impacts. In effect, the psychological and physical preparedness that becomes inhered within an anticipatory planning process makes it more likely that actions will be performed safely (e.g. in terms of communities being able to evacuate the most vulnerable early and 'dry', rather than needing to perform

more dangerous 'wet' rescues). **Experimentation and innovation** was undertaken within the FAG/CEP structures in the form of using the participatory process to develop realistic *options* in terms of how risks could be best mitigated in each plan area. In both Cockermouth and Keswick these deliberations included an interdisciplinary research approach to defining which measures would be most suitable for protecting the towns (e.g. structural defences, gravel management, up-catchment Natural Flood Management measures). Ultimately, primary focus was placed on developing structural measures in these two locations because it was felt that other options alone could not be relied upon to mitigate a desirable amount of risk sufficiently quickly (e.g. catchment reforestation would require many years to reach its full flood-mitigation capacity). Innovation in the other groups did occur, but was constrained by economic cost-benefit considerations. However, the LRF and other CEP facilitators have continued to **disseminate** good practice that has been achieved by CEP groups, by investing in a series of inclusive CEP and Community Resilience workshops and events, where groups are brought together with professional practitioners to share their experiences. **Monitoring and Review** is an important aspect of these events, with delegates working together to certificate CEPs using a peer-review type validation process.

BOX 1: emBRACE UK Case Study: North of England Floods: Cumbria

3.3 Exploiting the triggers of Social Learning

One aspect of social learning that requires further exploration is: when is the most effective time to prompt social learning? It is possible that different 'triggers of social learning' exist that will make some points in time more effective for using social learning to build resilience. For example, in line with the "window of opportunity" literature (Kingdon, 1995; Eijndhoven et al., 2001, Birkmann et al, 2008), knowledge could be more likely to be translated into proactive action towards resilience - and then shared - immediately following a hazard event. However it is also recognised that the opposite may also be true, as following flood events, affected communities may express a preference towards technical (engineered) protection such as bigger, stronger dykes as opposed to retention and multi-purpose flood plain management that may be more suitable to enabling longer term adaptation and resilience (e.g. Kruse, 2010). This dichotomy in initial community response was documented in two different locations in the case study above.

Therefore disasters are not always galvanising events in which the community all share the same views and opinions on its causes and potential solutions. Disaster events can also be a catalyst for actors to press for changes that they desired anyway (e.g. Klein, 2007). It is therefore imperative to understand the system into which the external impinges (be it perturbation through hazard or new information from 'expert'). From the political-economy theory perspective, larger crises and disasters can represent threshold events leading to organisational change where dominant ways of thinking and acting are subject to scrutiny and revision (Birkmann et al 2008). Holling (2004) believes that the ultimate form of learning, that has the potential to fundamentally transform system strategies and processes, is likely to occur in situations where change is essential and a system is highly vulnerable, e.g. after a major shock. However, if a timelag is often observed between knowledge dissemination and subsequent application, then it could be that this window of opportunity is taken advantage of in another way. If knowledge has been disseminated and discussed before, then a disaster could cement it with an experience. This would also help to demonstrate that learning is an on-going and transformational process where pre-existing ideas and concepts are challenged, reflected upon in the light of experience and re-applied to the problem, thereby allowing deeper, double or multiple-loop learning to occur.

It may well be that qualitative research carried out in various countries and case studies as part of the overall emBRACE project, may provide opportunities for social Learning to occur as part of the process, as well as opening the door to future learning. The process explored via questionnaires regarding resilience to earthquakes in Turkey 'forces' an answer from individuals regarding resilience, preparedness etc. which triggers a process of reflections, cognitive processing, vocalisation of their concerns and proposals regarding possible solutions. But if these questions are not being asked, deeper thinking about problems, or even recognition of such problems is possibly less likely to occur, allowing vulnerabilities to persist though inaction. For instance, in Turkey, when questions were asked regarding preparedness of government, communities and individuals, there was low confidence in the resilience of individuals and communities. The extract from the emBRACE deliverable 5.3 regarding earthquakes in Turkey illustrates this well:

Participants' accounts of low level or lack of preparedness of Sakarya community for a future earthquake revealed a number of preparedness hindering factors. These included forgetting about the disaster, lack of implementation of building safety regulations, and negligence of local government and/or state. The most pronounced factor that was perceived by the participants as hindering preparedness was forgetting about the disaster. For instance, one participant (#12) said "*[Earthquakes]* happen once in forty years. One generation experiences the earthquake, and the next doesn't. Afterwards, it's forgotten". According to the 52-year old male participant (#16), people forgot about the disaster (e.g., quake preparedness emergency bags, Grandpa Earthquake – nickname of a Turkish geophysicist [Ahmet Mete Işıkara] who talked about earthquake protection and safety after the earthquakes in the media to increase public awareness, etc.) because they did not want to think about the possibility of a future earthquake.

So, the research itself becomes part of a cycle of reflectivity about what might be learned from past events as well as providing an opportunity to allow the respondents to further discuss and enact change in their community. This is key to moving beyond rhetoric regarding Social Learning to making it integral to transformations within societies facing hazard threats.

3.3.1 Creating an enabling environment

Utilising social learning for resilience requires a shared learning culture to operate at the point of change being adopted (i.e. the point at which single loop learning branches). Social theories of learning prompt a questioning of the social variables that influence the learning of individuals and how this relates to collective adaptive capacity. Rayner and Malone (1998) identify social networks, rather than the form and volume of information, as a key variable explaining whether people pay attention to climate change and enter into behavioural change that is adaptive or mitigative. This goes further than the more limited view that presents failure in local adaptive action as a result of information deficit rather than a question of constraining institutional architecture. There are a certain number of external and internal factors, the presence of which will encourage learning that goes beyond the individuals into the social networks. Social learning operates at different scales, and as such different factors exist specific to each of these levels. In addition, there are some cross-scale

features that increase the likelihood of successful social learning for resilience. There are also some characteristics generic to society as a whole that would benefit social learning in the disaster resilience context. While the qualities at one scale do not determine those at another, they produce the conditions for one another through the ongoing emergence of institutions. The social environment in which individuals find themselves shapes the space of possibility for individual learning, and changes to the institutional framework that configures this space is an important collective behaviour in its own right. In order to maximise social learning, these characteristics, shown in Figure 3, must be enhanced.

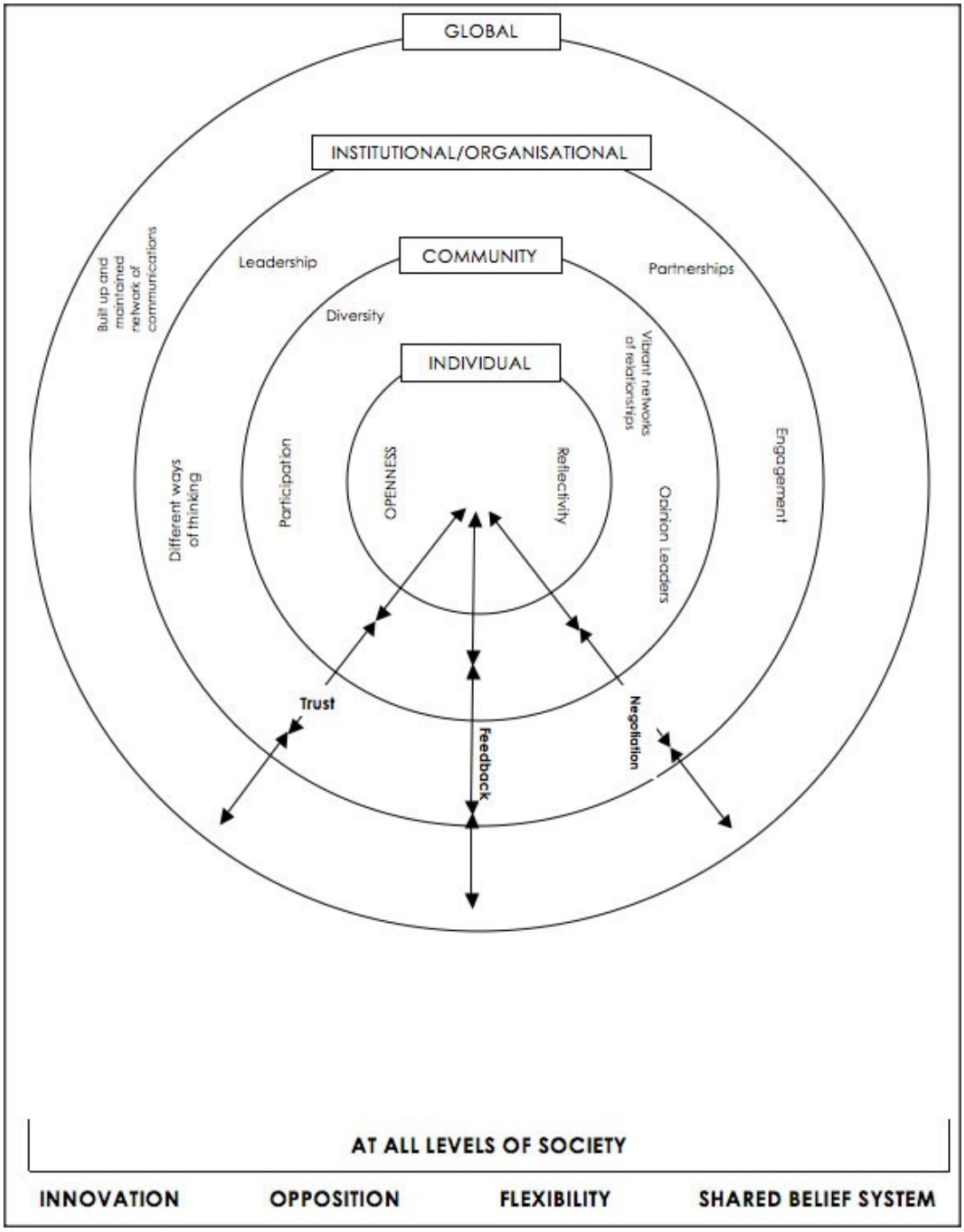

Figure 3: Revealing social learning (own figure)

3.3.2 Social Learning at the Individual Level

We have identified two important precursors for enabling Social Learning to occur at an individual level:

- Openness to engaging in learning.
- The ability to critically reflect on prior learning and knew knowledge.

Success of enabling social learning within individuals rests upon their openness and flexibility and maturity in engaging in learning. If individuals are close-minded and not willing to listen to new ideas social learning will be unlikely to take hold. Furthermore, the need for learning through critical reflection of self, current knowledge/experience and relationships with others is required, for developing *meaningful* social learning experiences. The idea of reflectivity is seen as crucial to making sense of experiential learning (e.g.Dewey, 1938; and Kolb, 1984); social learning (e.g. Bandura (1977) and transformative learning (e.g. Mezirow 1995, 1996, 2000). However the problem is how reflectivity can be built into the learning process with limited time and funding and when the idea of response is more seductive than perhaps the ideal response. Reflection is important to cognising experiences and fitting them within a schema of understanding. It allows for a sense making process of new experiences (even in the light of shocks, unexpected events or outcomes). However, what is currently missing is a space for these thoughts, ideas and reflections to become part of the overall response (public, scientific - including social science and governmental) to the threat from disasters in order to build a case for resilient societies.

Within the emBRACE framework, critical reflection is a key to learning as one of the three key components for building community resilience as shown in figure 1 (the others being Resources/Capacities and Action). By actively participating in a social learning process, individuals develop their capacities for engaging with others (including those from government or agencies responsible for environmental protection, for instance) thereby allowing them to take the action that is most relevant to them, while understanding the implications it may have for the wider community. The attributes involved in social learning at the community level is outlined below.

3.3.3 Social Learning at the Community Level

Likewise, at the community level, there are several components to successful Social Learning including diversity, vibrancy of social networks, levels of participation and the influence of opinion framers, all of which are outlined in more detail in the following section.

Existing studies stress the importance of diversity for learning processes (Reed et al., 2010; McCarthy et al., 2011). A diverse community is a resilient one as the learning capabilities and the creative powers available to such a community are greater (Wals and van der Leij, 2009). However there is a caveat: Diversity only offers a strategic advantage to a community only if there is a vibrant network of

relations and a free flow of information through all the lines of the network. If this free flow is restricted, distrust can be created and diversity becomes a hindrance.

Furthermore, if fragmentation exists, or individuals are outside networks, prejudice, friction or conflict can occur, preventing efficient learning (Pahl-Wostl, 2006). An important requisite of this is that connectedness includes connections to the most vulnerable populations in the community. For example, if social learning for building resilience to heatwaves is to be successful the interconnectedness of the community will need to include links with elderly populations (see further next section. This may require actively involving communities at risk in discussing what they do with each other and with an expert, so that knowledge is co-produced and shared. However this is not a simple task. In the London Heatwave case study (see deliverable 5.5) the elderly population, who are perceived as being of high risk in heatwaves, showed a great need of independence, which, as has been documented elsewhere (Sampson et al. 2013), often prevents them to seek further information. There is a general feeling that they know what to do with the heat and that the state is not in tune with their needs.

This report has also suggested that there is a need to better document elderly people's everyday life, so that the ways in which advice is sent to them might be transmitted through their social network and community centres. This is important, as they tend to put much more trust in their social networks than in information produced the state recommending what they should do.

Therefore, within a community there has to be established mechanisms for all members to have a say, both in physical terms, in the form of regular group meetings, but also in terms of inclusion and the respect of all voices. This view is supported by Scott's (1991) research on the transformative experience of community organisers discovering that when the needs of the ego are transcended and replaced by the needs of the collective this represents a stronger force and the group can, 'serve to represent symbolically alternative thoughts, structure, directions, and images for what is appropriate in today's society' (Scott, 1991 p. 240). Furthermore, Taylor (2002) cites studies that provide insight beyond an ego-centred motivation such as, inclusive of spirituality and transpersonal realms of development, compassion for others and a new connectedness with others.

Within a community there may be individuals who are able to influence others' attitudes or overt behaviour informally in a desired way with relative ease (Rogers, 1995). They are in unique and influential position in their system's communication structure, often at the centre of multiple-person connected networks. This informal leadership is not a function of the individual's formal position or status in the system, rather it is earned and maintained by the individual's technical competence, social accessibility and conformity to the system's norms (1995). This kind of individual is associated with trust, and behaviour of others could be modelled on their practices (e.g. Keys, 2012) However, it is important to note that in the same way that such a leader could successfully encourage changes in practices in line with resilience, they can also prevent such change by voicing their opposition and/or by acting as 'gatekeepers' to new knowledge or outside agencies. While there is a much literature on the role of opinion leaders as gatekeepers in multiple contexts, the role of leadership as in acting as a barrier to building resilience through social learning, is not considered well in the literature but could be harnessed to help prevent blockages in sharing flows.

3.4 Further factors to consider when promoting Social Learning.

As previously mentioned, the social learning appears to be most commonly instigated at the institutional level, whether it be from a local NGO, a national government, or a multi-national private organisation. Therefore those in a leadership position can help manage conflicts arising from different opinions and facilitate the translation of learning into the emergence of new structures for resilience. Building consensus, rather than imposing it, is key to successful development of Social Learning.

Furthermore, systemic leadership is not limited to a single individual but it can be shared, and then responsibility becomes the capacity of the whole (Wals and van der Leij, 2009). However, leadership on its own can lead to power struggles and issues with authority. If information is to be negotiated, discussed, and ultimately acted upon then trust in the coordinating authority as well as between other actors must be present. Considering the seemingly large importance of this issue, the literature is relatively lacking.

Good leadership will also be able to facilitate negotiation in order to allow for a fair consensus to be achieved. Disagreement fosters discussion and exchange of different knowledge (Gray, 1973; Boyd and Richerson, 1988). Therefore, opposition

can manifest social learning for building resilience as long as it is not cemented and immobile within the system. The uncertainties of climate change also suggest it is worth re-visiting the possibilities of enabling internal dissent as a positive force for local innovation surrounding resilience. Some participatory methodologies (e.g. participatory mapping but also some forms of participatory modelling) are particularly appropriate to isolate areas of disagreement and thus can be used to help create the conditions for successful social leaning to be fostered.

The presence of conflict in forging collaboration must be harnessed in negotiation (Leeuwis and Van den Ban, 2003). Diverse opinions must be able to be expressed and power imbalances addressed as this will enable more trusting relationships which is more likely to lead to all of the actors committing to what is being discussed, decided or acted upon.

A conducive environment must exist where institutions can share both knowledge and spheres of influence. Partnerships will help facilitate this exchange, identifying space for regular, ongoing dialogue both within and between institutions. The establishment of continuous channels for dialogue is essential if it is to result in outcomes which remain relevant and develop as learning contexts evolve (Humanitarian Futures Programme, 2010). The diverse community must be included in the learning process, thus facilitating the establishment of new and strong partnerships. Social Learning approaches offer an opportunity to encourage and value the views and experience of those normally excluded from the decision making process, previously. Advocates of closer collaboration are currently found within both climate science and risk management. However, these developments are occurring more in parallel than in concert (Wilby, 2009). Creating contexts in which social learning might take place necessitates bringing together people who have very different world-views and knowledge systems.

However, there may be complex boundary issues. Stakeholders in different areas may have different geographical and issue-related areas of interest and operate at different spatial scales. The power dynamics implicit in bringing different knowledge holders together influence the subsequent learning outcomes (Wildemeersch 2007). Indeed, cross-scale networks characterized by strong linkages and nesting hold the potential to create opportunities for actors operating at broader scales to mobilize knowledge and exert power over local resource users (Adger et al. 2006). Therefore, assuming that high levels of interaction between stakeholders in any given situation will lead to social learning is simplistic (Cundill 2010), and a deeper understanding of

the context, power dynamics, and values that influence the ability of people and organizations to manage natural resources effectively is necessary (Keen et al. 2005).

Therefore the integration and bringing strength from different ways of thinking, different types of knowledge and diverse experience is essential for knowledge generation and application decisions. Without the inclusion of a continuum of ideas ranging from traditional, dominant ideas and values on the one hand, and innovative but so far under-represented ones at the other hand, no dissemination can take place. This tension between old and new is what Pelling (2011) sees as the central contribution of social learning to studies of adaptation, and easily transferable to resilience. An important furthering of this discussion is surrounding how people can become more sensitive to alternative ways of knowing, valuing and doing.

Feedback is essential for self-regulation and self-organisation. The time and space to allow for critical reflections must be built into learning programmes. Allowing a network to learn from its mistakes, gives it a chance to act differently in the future. This is an example of how a community has its own learning capacity. In addition, although learning can take place as a consequence of self-reflection by individuals and organizations, their inherent connection to the wider social-ecological context means that even the most intrinsic learning processes are, to a certain degree, inspired by external ideas, values and norms. An explicit acknowledgement of this externality highlights the fundamental importance of inter-agent relationships for learning, and raises questions on the complex interplay between knowledge dissemination and the development of new ideas. The complex interplay between knowledge dissemination and the development of new ideas fits well with ideas of feedback mechanisms, which are central elements in both learning theories and resilience thinking.

But what of motivation? It is important to understand what motivates some individuals to want to do something about the environment or to respond to the perceived and actual threat to their lives and livelihoods from a range of hazards. This again, is supported by Bandura, who wrote that: “Much human behavior, being purposive, is regulated by forethought embodying valued goals” (Bandura, 1994, p.74). One interpretation is that individuals will set up tasks for themselves based on what they believe to be achievable through their actions while also important to them in terms of their ethos, world-view or progression towards a goal. This is important because

before behavioural change can occur, one of the first obstacles may be to convince the individual of the importance of their actions in relation to these beliefs.

Bandura's theory recognizes this and consequently separates perceived self-efficacy from perceived environmental control. This was noted by Madsen (1987) when making an examination of political self-efficacy, commenting on the importance of the responsiveness of institutions, such as governments as being important to belief in the value of taking actions. Furthermore, Social Cognitive Theory (SCT) makes a clear distinction between the forms of agency through which people manage their lives though decision making and action taking. Bandura terms these forms of agency as being *personal, proxy* and *collective* (Bandura, 2000). Personal agency (of which a primary mechanism is self-efficacy or belief in one's ability to do something), has been mentioned previously but it is useful to examine both proxy and collective agency at this point as a means of further identifying what can lead to behavioural change.

Proxy agency arises when "people do not have direct control over social conditions and institutional practices that affect their lives" (Bandura, 2000, p. 75). This leads to individuals seeking to improve their well-being and security through a proxy agency that they believe has the expertise or the power to act on their behalf to achieve desired outcomes. This is an interesting response to the value-action gap, suggesting that this may be a way to close it, but there is a danger that this also dilutes personal control and agency, allowing others to bear the responsibility or take on board the stressors of such an undertaking, while losing out on the development of what Bandura calls *requisite competencies* (Bandura, 2000, p. 75). This proxy agency also tends to suit those with an external locus of control, which has been shown to be an inhibitor for behavioural change (Rotter, 1966; Ronan and Johnston, 2001) as these individuals believe external forces such as nature, luck or society have the dominant control over their situation.

However if there is a collective who share a perceived efficacy and believe that their chances of success outstrip their individual efficacy, this is a powerful motivator. An example of this from our research comes from the Sud Tyrol case study which found that community identity and the feeling of belonging is an important aspect for resilience. The environment, in this case study is the Alpine one, forming a strong part of community identity with its conservation while living in it, an intrinsically part of everyday life. There is a fundamental dichotomy that residents face: on the one hand it is source for economic prosperity and on the other it is also source of danger and

potential damage to lives and livelihoods. This understanding and interest in both preserving and working in this environment has led to a collective that has an important role as sources of information and knowledge, but also as being experienced in coping with natural hazard events. Most of the actors involved in the response phase are also part of the community. Trust was revealed to be a crucial element, among risk management actors, as well as between them and the local population.

Furthermore, the described community 'belonging' is also a driver for learning. In Badia, the municipality recently developed a local civil protection plan and there are regular exercises for emergency cases. In the Sud Tyrol case-study motivators and drivers for learning and change are the key actors within the community, while robust networks within the community coupled with strong community identity have the potential to influence and motivate other members of the community.

This does not mean that a collective will not experience obstacles or hostility, but rather it is how they use their collective resources and tenacity when faced with such opposition to their aims that is an indicator of the usefulness of collective efficacy. Bandura argues that for such collectives, success is more likely it is "supported by resources, effort and staying power", especially when: "collective efforts fail to produce quick results or meet forcible opposition" (Bandura, 2000, p. 76). This is especially pertinent for people taking on tough social problems - a category that would seem to fit disaster risk reduction. By encouraging social learning it is more likely that individuals taking part and engaging either share this perceived efficacy going into the programme or alternatively may choose to partake in the learning experience because they do not believe they have the skillset to prepare for or cope with the hazards that they face, but hope to have these developed by taking part.

Social Learning by itself is not a panacea to creating disaster resilience in communities. Rather, it is part of a complex process which needs to make use of a wide range of stimuli, practice, experience, and knowledge which when shared and reflected upon, may provide a cognitive schema that develops resilience thinking, attitudes and actions over time. An important influence on moving closer to resilience is innovation, which includes the use of technology. However the technology needs to democratised, with open access supported by training on how to make use of both the technology and the data it produces.

Social learning is important as a way of spreading these new practices but before that innovation must be encouraged – and designed well and appropriately. This too can happen by processes involving social learning. This must be throughout all scales. In some cases expansion of scientific knowledge and practices will be essential, in others local innovation will be more appropriate, and ideally the two should be integrated. Concepts and practice of flexibility, adaptability and reflectivity is essential for allowing innovation to flourish. However this needs to become part of the culture, which itself may be learned over time through open communication. Flagging up and embracing learning that acknowledges failure alongside success, while using both as an opportunity to learn, adapt and integrate new practices should be encouraged at all levels. This obviously requires that trusting relationships between all interested parties are encouraged and opposition or reluctance to new ideas are able to be seen as opportunities to adapt and learn – both of which are key to resilient communities, as outlined below.

3.4.1 How Social Learning can address vulnerability in the 'well informed'.

Furthermore, a balance needs to be struck between Social Learning that enables and encourages communities at risk to share new or existing knowledge and developing an understanding with the knowledge holders that their knowledge/social capital may create vulnerability in other ways, by creating a false sense of security, as to their resilience or preparedness. In an example from the heat-wave case study this was found with some who appeared to have a well-developed knowledge capital but their isolation from others (including a family or friends) especially at times of heat stress led to vulnerability. This is explored in the following excerpt from the London Heat-Wave (deliverable 5.5: p.104-106):

Although all interviewees were connected to the internet, educated and well-travelled (thus having experienced the heat in very different ways in their life, from tropical to the Saharan type of heat) and they knew about climate change and its potential implications for health and infrastructures, their social capital and still very active lifestyle made them feel different, if not external, to their age group. For example, a 73-year-old woman said she is active in helping older people in a project about learning which kind of information to follow during the cold, and she mentioned that she goes

> “to lunch with other older people, partly to do with my work, but also to observe and to get very decent meals and so on. Joe and I go several times a week. I noticed that amongst these older people, they’re often needing to ask me for information. They haven’t got access to the information that I have”. (Interviewee 11, Barbican)

What comes out of this quotation is a good example of social status that made them (her husband and herself) more aware than the others about how to prepare for extreme weather. This sense of being well informed also creates a false sense of security infusing the belief of not belonging to “those older people” which in turn preventing them from engaging with the dimensions of loneliness that follow in the interview:

> “I don’t have children. It's my first marriage. I have one or two cousins up in the north and the south who I correspond with two or three times a year. So I don’t have, to all intents and purposes, a family with whom I would exchange information. Unless something dire happened, like my cousin was diagnosed with something and we would talk about it as that happened. But in everyday terms, no, family is not in the picture. It's happened to a lot of people”. (Interviewee 11, Barbican)

Although many elderly populations living in occidental countries experience loneliness, perhaps more predominantly in Anglo-American settings, Interviewee 11 lived with her husband. They had a very active life, but her statement reflects the lack of close relationships most interviewees of the Barbican have raised in our sample. She was not in touch with family nor with friends nor that did she receive advice from friends or family about what to do during period of heat. As the quote above demonstrates, she does not consider belonging to those in need of advice. This feeling of being different shows a lack of consideration for vulnerability that emerges out of the frame provided by the medicalization of heat-risk. The intrusion of social capital here is interesting, as not only does it play a role in the ways in which social networks are developed, but it also influences the ways in which advice is taken by the more affluent and educated. Instead of seeing the most knowledgeable following expert knowledge, their capacity to understand information might rather distort them from the resilience pathways imagined by proponents of medicalization.

While professional and personal networks differ in their relation to social capital, the more affluent seem to be secluded from professional/institutional/conventional networks – whilst those from less well-off background, such as those encountered at Waltham Forest and Islington, were often supported by family, friends or flat and

house mates. Those observations reveal a different look at resilience building, particularly if there is a need for community resilience to be developed, as it cannot addressed solely through technical-scientific dimensions. Rather, paying a close look at the social networks providing the essence of how people relate to each other, and what effects those networking capacities have over their abilities to secure ways to cope with the heat, is in turn displacing the taken for granted political economy of heat-related risks. Those findings are enabling us to recast vulnerability into wider questions of community and how resilience can address the wider challenge of what Jean-Luc Nancy (2000) frames as the *being-with* or the *being-in-common*. In an era in which ageing alone has been notified as a 'normal' process, the loneliness experienced by many interviewees seems more related to isolation, a condition that prevents them building resilience as well as the capacity to imagine this being-in-common to be realised before, during and in the aftermath of an event. In other words, and interestingly, limited social networks seem more common among the well-off population, which in turn differentiate them from the normal patterns associated with political economy of risk. If those patterns are refreshing, the next section will show how networks of people and institutions are confronted by different realities.

Flexibility is a key feature of a resilient system as it allows the system to cope with disturbances that can then become triggers for learning. The norms operating within a social system can be a barrier to flexibility and change. Norms can operate at the level of a country, an organisation, a religious group, or a local system like a village or even a household. If restricting norms are limited, then changes in behaviour in line with building resilience will more easily be taken up.

Such learning through interaction is constrained by the established norms found within the social contexts in which individuals are embedded (Wenger 1998; Prell et al. 2010). Such contexts include not only institutions, but also the networks and network structures in which individuals and groups are embedded (Newig et al. 2010; Prell et al. 2010), and the epistemological beliefs and world views of people in that social context (Miller et al. 2008). Social learning is more likely to occur if groups with different types of knowledge, for example local vs scientific, share similar epistemological beliefs (Greenwood and Levin 1998, Evely et al. 2008, Raymond et al. 2010).

Another example from the London Heat-Wave case study is included below in which the informal networks (via the family), play a prominent role in elderly populations tackling of heatwave vulnerability.

While carrying out qualitative research as part of the Heat-Wave case study, most people interviewed at the three different sites (Islington, Barbican and Waltham Forest) highlighted being aware of what needs to be done when it is hot, with very little perceived support coming from the NHS, GPs or local authorities about how to keep cool. Rather, when this kind of information (which was very little) was received, such advice came mostly from family and friends – often varying in shape and content, from children phoning and ensuring their parents "were drinking enough water and mentioning how the forecast will change" (Interviewee 14, Barbican), to a spouse explaining how to cool the house by deploying fans in specific ways, or simply neighbours giving tips such as shutting window blinds during the day and only opening windows at night.

Unlike in the USA (Sampson et al. 2013; Klinenberg 1999, 2002), fear of violence and crime was not an issue within our sample, so people were happy to open doors and windows to create draughts; in London, crime levels are considerably lower than in most USA cities. It is also interesting to note that most interviewees were very clear about knowing what to do when it was hot and they found the pamphlets provided by the NHS rather useless, if not insulting and alienating. This is exemplified by an 85-year-old woman who was discussing the advice given to her through an NHS brochure:

> **Interviewer:** Was there anything that you have read in this pamphlet or letter that you knew already?
>
> **Interviewee 15:** Everything.
>
> **Interviewer:** Was it useful for you?
>
> **Interviewee 15:** No. Actually I binned it. I put it in the bin, because it's ridiculous.

This interview segment relates how a patronising tone, generated in the spirit of the preventive approach to risk, led people simply to ignore information and throw it into the bin. This disdain for paternalistic messages was also noticed among the American elderly by Sampson et al. (2013), who showed that many elders prefer to

decide for themselves what is best adaptive behaviour they should adopt. This wider feeling against an apparently paternalistic effort to protect the elderly has been also noticed by carers who made it clear that older people "want to be treated as independent adults and not as children, so we are not there to tell them what to do, but just to help them reminding things" (Interviewee 16, Islington). Carers also emphasised that many elderly people might be too confident in their capacities and might therefore need to be reminded about what to do – such as drinking water and fruit juices, and eating salads and other food that contains a high content of water.

However, despite these reminders, something that became clear during the research process was that most elderly people seem to know what to do when it is hot, from dressing lightly to creating draught and having cool showers, to other more sophisticated techniques, such as this from one interviewee:

> "The best thing (sic) of advice I would say: is get a fan. Get a bottle of water and put it in a freezer. When it's frozen, put it in front of the fan and it's like an air conditioner" (Interviewee 17).

The most pervasive feeling that came out of those interviews was that experience to heat over previous years might play a part in how the elderly deal with high temperatures, and this in spite of ageing, which can also play a role in how temperature affects the body. As one interviewee mentioned, "it seems worse to me this year, but this might also be because I am ageing" (Interviewee 18, Waltham Forest). An 85-year-old described how she developed her capacity to cope with the heat:

> "Really it comes from me, we had this kind of weather when I was a child, it isn't new, we had summers like we had, so. . . I like the weather and summer, but I prefer it cooler, it is nicer in the shadow of a tree [. . .]
>
> **Interviewer:** but what are you doing to improve your comfort when it is hot?
>
> I am using my common sense, for example going out in the evening to go shopping, creating draughts by leaving the doors open, and if I don't feel like cooking, my son's girlfriend can do the cooking for me and he can go out shopping". (Interviewee 19, Islington)

Consequently, there are still challenges to building resilience among communities that are not always expected or obvious. Furthermore, much of the resilient behaviour appears to be individualised with a range of coping strategies and mechanisms used to cope with heat stress. However, the opportunities for sharing good practice were limited by lack of communication with others (especially at times of heat stress as one of the principal coping strategies was to stay indoors!) This self-enforced isolation, coupled with isolation through habit, lack of family/friends nearby or other reasons, may contribute to the vulnerability of elderly populations, as the examples above suggest.

What is needed therefore, are mechanisms, opportunities and spaces for Social Learning, reflection and knowledge sharing to exist. Perhaps drop-in centres close to or as part of complexes where the elderly may live could share examples of how to cope with heat stress discussed over tea and biscuits is a more effective method than leaflet dropping which according to interviews didn't have the desired effect. This may not be because the advice was paternalistic, but because leaflets are impersonal and don't allow engagement while highlighting the isolation of the individual instead of allowing the individual to talk with and share with others their ideas and strategies for keeping cool in heat-waves. If health visitors/wardens were also on hand with leaflets or further advice then messages about taking on fluids, eating salads etc. could be reinforced, while the rooms where such drop in centres take place could be cooled by the methods suggested by respondents in the London Heat-Wave study, which become learning/talking points for those who drop in. This may provide a more holistic method for Social Learning that is constructed via knowledge, experience, reflection and action. Therefore, these lessons from the London study may inform wider social learning practices to be included in the overall emBRACE framework.

However it is recognised that the Social Learning approach is sometimes hard to quantify and that this is a challenge to building resilience. This and other challenges are included in the following section.

4. Challenges to building resilience, including Social Learning

A few obstacles and challenges appear more than once in the literature surrounding social learning and disaster resilience.

4.1 Uncertainty or novelty acting as barriers to learning crossing scales.

When the relevant differences and dependencies of actors at different scales are known, the reuse of the common knowledge has positive effects and the path-dependent nature of knowledge proves beneficial as information and knowledge is shared and passed on. However, when novelty (which may include the impact and shock of a disaster for instance) increases the path-dependent nature of knowledge has negative effects (Hargadon and Sutton, 1997) because the common knowledge used in the past may not have the capacity to represent the novelties now present resulting in a knowledge/experience gap and reduced resilience(Carlile and Rebentisch, 2003). However, Carlile and Rebentisch (2003), also make the point that novelty (which in this case could include the threat from natural hazards/disaster) provides an opportunity to share knowledge and experience in a way that transformation of knowledge and practice is more important than the acquisition of knowledge by itself. This would suggest that there is an opportunity for social learning to evolve practices and knowledge beyond current modes of resilience of communities facing disaster threats.

4.2 Difficulty in providing motivation for change.

Social learning relies on there being motivation for the change in behaviour, lifestyle, or value. However, in many cases, a proposed change may lead to increased disaster resilience that is intangible. Alternatively, whilst the benefit may be tangible, it may only be visible in the long term. In addition, in some cases a behaviour change may lead to increased disaster resilience but not for the individual making the change. Instead the change may be part of a collective action that cumulatively could build resilience for the most vulnerable groups. Therefore a threat to social learning may come from being unable to counter the tendency towards short-term narrow self-interest, which may also be evident at governmental scales when budgets are restricted and the impetus for investment is reduced.

4.3 Potential power conflicts.

Tompkins (2005) demonstrates the tensions that can be reflected by contrasting ideologies, emerging through the interplay of top-down command and control risk management and local self-organised adaptation.

4.4 Path dependence.

Path dependence has been defined as: 'the dependence of future societal decision processes and or socio-ecological outcomes on those that have occurred in the past' (Preston, 2012, p. 719). This is closely related to the paradigm shift in disaster analysis from the concept of 'natural disasters' to the idea that disasters are not natural but instead a factor of vulnerability and exposure levels in addition to the physical hazard, highlights that disasters are path dependent. In other words, disasters as a function of hazard, vulnerability and capacity, which can be illustrated by disasters equation D= H×V−C, for instance. Different demographics of the population have different socio-economic positions, created over time by decisions, actions and the maturity of those practices, and these positions determine their access to risk-reducing resources such as healthcare, education, and livelihoods. Examples of path dependence comes from water management in the US West where water management choices regarding allocation are constrained by historical infrastructural investments (Libecap, 2011), while examples within the US agricultural sector, path dependence occurs through the US agricultural industry's constraint of farmers capacity to alter management practices and technology in the face of climate change realities (Chhetri et al, 2010).

In the same way, resilience to disasters is path dependent, which means that resilience outcomes tend to be a function of either ingrained or available learning, capacities and actions. Solutions are historically built into a structure that can inhibit the rise of certain new paths, which break with the existing structure. Social learning for resilience relies on changes to systems, practices, and structures, and depending on previous decisions over time and how far they have matured, there may be a limit to what social learning can achieve. For example, it would be incredibly difficult for social learning to overcome deep-seated gender disparities that cause great vulnerability to disaster amongst women in certain countries. If path dependencies are to be critically questioned, then learning must take into account the relationship

between long-term visions of the future and short term action. How can these two time spans be meaningfully coupled in practice?

4.5 The risk of a decrease in resilience.

One weakness of social learning is that benefits do not accrue automatically from employing the process. Social learning can instead drive and perpetuate vulnerability or a decrease in resilience (Glasser, 2009). It is an approach that can be harnessed for building resilience but can in addition lead to the spread of ideas and actions that undermine community resilience.

4.6 The necessity of capacity building.

Social learning's effectiveness in building resilience may rely on effective capacity building (Glasser, 2009). Individuals may understand the need to change their purchasing habits, and indeed want to change their habits, but unless certain goods receive subsidies, for example, then some will be unable to make that change.

5. Methods for observing and measuring the effectiveness of Social Learning

Much work is currently devoted to develop system indicators to quantify and value a system's current status regarding economic performance or ecological and economic sustainability (Pahl-Wostl, 1998). These measures refer, in general, to static properties of a system. However, little attention has been paid to the dynamic properties of a system such as its flexibility and adaptive potential. However, this is now growing in line with the expanding adaptive capacity for climate change adaptation literature. Measuring the effectiveness of social learning towards building resilience will help highlight good and bad practices so that social learning initiatives can be improved and tailored more efficiently. This is particularly important due to the early stage that the research for employing social learning is at, particularly for building disaster resilience.

Individual learning is fairly easy to measure when weighed against pre-determined outcomes, but what is its aggregate? At the group level, change itself can be an indicator of learning, with change viewed in either a positive or negative light. For

example, change can be unsettling and may even cause conflict (of ideas, beliefs or actions). However being unsettled, challenged or even confused by new learning is part of the process to undergoing transformative learning experiences, which may be a by-product of social learning or vice-a-versa. Transformative Learning techniques open scope for promoting self and group efficacy within learning systems. Self-efficacy (e.g. Bandura, 1977, 1997) is the belief or confidence in oneself to take action and more importantly, to persist with this action. Group efficacy is a group's collective estimate of its ability to perform a task successfully (e.g Gibson, 1999, Whiteoak et al., 2004). Bandura, (2000) argues that self and group efficacy increase confidence and are associated with longer timeframes for the maintenance of learnt skills. This is discussed further in the following section in more detail.

Methods for measuring the effectiveness of social learning in the context of building resilience could seek to measure ***retention and application of knowledge*** and the ***'sphere of influence'*** of this knowledge (i.e. how wide the knowledge and its application has spread from its source), the ***learning efficiency*** (i.e. the time lag between when information is received and when it is acted upon), the ***routes that the transmission occurred*** through, and the ***types of people included and excluded*** from this sphere of influence. However, effective methods for measuring these factors are few and far between. In addition, feasibility differs depending on some of the variations in social learning processes, and the environment it is embedded in, highlighted throughout this deliverable, including what kind of application or outcome is desired as well as at what scale the process is taking place.

5.1 Maintaining learning over time and the importance of self-efficacy.

Key to enabling longer-term changes in attitude and behaviour require learning rather than knowledge transfer, which separates it from earlier knowledge deficit models of behaviour change. If learning rather than education takes place allowing previous assumptions to be challenged through a combination of knowledge, experience, practice, reflection and teamwork, a stronger self and group efficacy may be *maintained.* It is this maintenance and longer-term attitudinal or behavioural change that is missing from current DRR educational programmes. By examining the impact of the social learning on individuals, their families and community it may be possible to understand what processes (e.g. self efficacy, socially-constructed learning and

transformative learning) are evidenced and to what extent these could be replicated in other DRR learning projects.

5.2 Retention and application of knowledge

Measuring genuine *understanding* is perhaps a more difficult task. Experimentation with the use of simulation games to gauge the understanding of different actors surrounding risk and resilience issues following initial learning activities may be a way of assessing understanding. Games can potentially better indicate individual's and groups' understanding as it places their knowledge in a practical scenario. However, care would need to be taken to develop this at arrange of scales. Measuring value change is not easy but might usefully be tested through the application of Q methodology (Stephenson, 1953,1993). Q methodology captures the essence of what the participants feel about a topic from collective voices, while at the same time identifying subtle differences between some of these voices.

5.3 Learning efficiency

In order to determine how quickly knowledge translates to application, the above assessments would have to be made regularly, from just a short period after initiation and for years after, in order to determine a rate of change. This is particularly important if the relevant resilience outcome is a sustained value change.

5.4 Emerging transmission routes

Some online social media can track the pathways that are being used to discuss certain topics. Twitter provides a good example: topics are flagged and the number of people discussing them can be calculated over time to provide an assessment of how quickly discussion of the topic is increasing. One can also find a simplistic indicator of how discussion is spreading over different pathways through monitoring "re-tweeting", the forwarding of another's comment to others. However, the pathways on the ground that have been used to share knowledge and demonstrate a change are complicated – and sometimes complex – to understand in a more sophisticated manner than simple monitoring or observation.

5.5 Types of individuals included and excluded from the social learning

In order to evaluate the types of individuals included or excluded from a particular social learning initiative the above assessments will have to be coupled with targeted survey questions on issues to do with presence in networks and vulnerability. It will be key to determine if any vulnerable groups are being missed from learning networks.

5.6 Other measuring options

Another more tangible measuring mechanism is to assess the potential and actual existence of the enabling environmental factors detailed in figure 3. This approach to measuring social learning may be more appropriate as our concern should not be with static expressions of resilience measured though action, but rather with the underlying institutional arrangements of the social-ecological systems that give shape to social learning and so prefigure resilience. These factors, such as community participation, institutional partnerships, and incentives for innovation, can be interpreted as indicators for social learning. The majority of these factors are relatively simple to assess through reviews of policies and structures. However, some are more difficult. For example, trust across scales will require attitudinal surveys or small focus group observation.

The above discussion has highlighted that measuring social learning is probably most feasible at a more localised scale whereas evaluating the impact of an initial communication of information and necessary change across a large number of individuals or organisations holds many difficulties. In addition, attempting to measure a long-term value change will likely be harder than quantifying a change in “XXX”. What is important is that when social learning is measured, these complex differentiations are taken into account rather than assessing social learning processes in a generalised and simplistic manner. There is a need for further research in all aspects of resilience impact and evaluation. Furthermore, baseline studies are essential for evaluating learning techniques in order to attempt to garner the level of understanding and extent of current practices, and various methods are described in examples. The majority of examples are based at a small localised scale and so the baseline methodologies include small scale questionnaires, one-on-one interviews, and focus groups (e.g. Litt et al, 2002; Ison and Watson, 2007; Rist et al, 2007). At a slightly larger scale, some baseline methodologies include reviews of existing organisational or local policies.

6. Gaps and further research opportunities

Case studies are beginning to develop and discussions starting to be had on the use of social learning for building disaster resilience. However, beyond the acknowledgement of its importance, the notion of learning has not yet been explored systematically in research on resilience. The main gaps in the research have been highlighted throughout this document and the following section will summarise these issues. The main focus is on the lack of depth given to the many variations that exist within the social learning process and the environment it is embedded in. Social learning for building resilience is generalised with little or no thought given to the need to differentiate between a number of factors.

6.1 Differentiation according to outcome desired.

Social learning is often described as if an outcome, whereas it should be used to define the process towards which one can achieve a variety of outcomes. In the context of resilience this can be a change in understanding, values, or practices. These outcomes will not all be achieved by the same kind of learning process, and the variations needed in the learning process in order to achieve these different outcomes need to be investigated.

6.2 Exploiting triggers of learning.

Further research is needed to investigate the relative success of social learning for building resilience when knowledge is instigated at different times. Perhaps the traditional view that immediately following a disaster is a good opportunity for social learning to be initiated is too simple, and that research needs to be conducted on the options of instigating learning prior to hazard events, and on the effect of disasters cementing that knowledge further and encouraging more rapid and sustainable sharing of learning.

However, this is a risky premise given the likelihood that perhaps-avoidable impacts would need to be endured before maximum effect would be considered achievable. Further than this, a precise knowledge on how drivers of learning inside or outside of social-ecological systems interplay to generate motivation for change and transformation in social-ecological systems remains to be developed in research on resilience. Distinguishing between endogenous and exogenous drivers has received

almost no attention in the literature on social learning in social-ecological systems so far. Social learning to cope with knowledge deficits and uncertainty about goals and actions presents an endogenous driver for learning processes, whereas the empowerment of stakeholders is a goal likely to be formulated by actors outside of the social-ecological system. This omission is surprising, since a differentiation of both forms of drivers can add preciseness to the analysis of learning processes and allow for a better understanding of where and when possible interventions on building resilience should take place.

Within the Turkey case study (deliverable 5.3), lessons learned about the perceived and known efficacy of buildings to withstand seismic stresses as well as the reminders provided by an earthquake event and its psychological impacts came from interviews with individuals living and surviving previous events:

When discussing about the preparedness of Sakarya community for a future earthquake, some participants mentioned having earthquake experience and living in low-rise buildings as preparedness facilitating factors. For instance, according to one participant, the 43-year old male imam (religious functionary) (#4), having earthquake experience increased psychological preparedness of individuals. He said:

> *It differs from person to person. Lessons learnt may be different. There may be differences between people who were in the middle of it and those who did not experience the earthquake. I believe it is hard for anyone who experienced the earthquake to get it out of their minds. We used to get to bed prepared for an earthquake; we were walking the streets thinking this building might collapse now and take me with it. And this lasted for a time because the effects of the earthquake were visible for some time, ruins of buildings, people dying afterwards. Even a slight tremor will remind people because they have experienced the earthquake. They have internalized it.*

Another participant, 33-year old female contract employee (#1), stated that people learned about what an earthquake was after 1999 and that this was associated with

knowledge on what to do during an earthquake, thereby, increasing preparedness.

In addition to having earthquake experience, two participants considered living in low-rise buildings as facilitating the preparedness of Sakarya community for a future earthquake. One participant, the 50-year old male medical service employee (#9), talked about his own preparedness. He said:

> *I, personally, live in a lower building as a precaution and I am thinking of buying a trailer and be prepared for that day. I even have my research about it. As soon as I find a place to put the trailer, I will buy it and be prepared. I have a plan but I have not yet actualized it.*

Another participant, the 38-year old male academician (#3), mentioned the decrease in high-rise buildings in Sakarya as facilitating preparedness. He commented:

> *At least, they have decreased multi-storey buildings. Adapazari started expanding horizontally. Although new areas of residence have not reached the desired levels of population, people continue to settle in Maltepe, Serdivan, Hizirtepe, and other districts on the hills. As I said, there are no more high buildings, and this diminishes the risk of destruction. Therefore, I think that people are not that anxious anymore.*

There are interesting comments here regarding risk, perception and barriers to inaction (such as time, money, space). There are also opportunities to address issues of construction standards that are enforced and providing spaces for experience, reflection and potential actions to be shared. One of the most striking features of the Turkish research interviews, was the strong sense of social solidarity within the community following the earthquake as this extract from deliverable 5.3 shows:

Social solidarity was the most pronounced factor that was perceived to be facilitative for post-quake coping/adaptation. More than half of the participants stated that social solidarity within the community as well as within the family helped people to recover from the earthquake. With regard to social solidarity within the community, seven participants emphasized cooperation between community members in the aftermath of the earthquake. These participants referred to people's sharing their resources (e.g., home, food, etc.) with disaster survivors and how this facilitated survivors' post-quake coping/adaptation. Particularly, according to one participant, the 43-year old

male imam (religious functionary) (#4), social solidarity was psychologically helpful. He explained:

> *I saw that the greatest effect was uniting, feelings of fraternity and solidarity in troubled times. I saw that we were more united on those difficult days than in normal times. I mean people did not discriminate, they were united. I witnessed people acting as one to relieve the difficulties. They shared their house, tent, food, and bread. I witnessed that sharing eased the pain somewhat*

Therefore new projects seeking to build resilience in at risk communities need to seek out these individuals as likely 'mavens' (Gladwell, 2003) and as someone who can speak to experience of survival, coping and past resilience in order to develop this for the future.

6.3 Consideration of the impacts of power

This is largely absent in the literature on learning in social-ecological systems (Osbahr, Boyd and Ericksen 2007; Armitage, Marschke and Plummer 2008; Tschakert and Dietrich 2010). Yet, very little has been done so far to address this shortcoming. The lack of attention given to power dynamics in studies on resilience, in general, and in studies on learning for resilience, in particular, corresponds to the management focus of equilibrium-centred resilience approaches that are rooted in ecology. As the focus of resilience research is gradually shifting towards flexibility and transformation (Folke 2006), it increasingly incorporates social dimensions, like learning itself. This knowledge, however, is still far from being able to offer a comprehensive account of social dynamics in resilience research. Power dynamics in research on social learning in resilience are addressed primarily in studies that explore learning as part of innovative natural resource management strategies (Rist et al. 2007; Reed et al. 2010; Tschakert and Dietrich 2010). In these studies, learning is considered an important element of participatory resource governance. It thus offers opportunities to study how power dynamics influence management practices. Exploring the notion of action learning, Tschakert (2010), for example, underlines the importance of power inequalities in spatially-bound places for learning. The analysis has an empirical focus on groups in adaptive management and argues that questions of power shape learning processes in participatory resource management. In a

similar vein, Reed et al. (2010) point out that power dynamics shape the outcomes of learning processes. The authors underline that learning is fundamentally about social interaction. Its outcomes are shaped by questions of hierarchy and control.

Interacting actors and groups from diverse social contexts represent different epistemological world views, norms and values. Power dynamics are inherently part of this diversity, which therefore carries a significant potential for social conflict. While these insights might offer a first consideration of power dynamics in social learning, they are limited to the natural resource management context of the study (Reed et al. 2010). This undermines the applicability of the findings to wider social-ecological contexts.

6.4 Moving beyond maintaining Resilience.

What role can social learning play in going beyond responsive modes of resilience that only bounce back after a disaster (to conditions that existed prior to the event without considering root causes), towards learning that has the capacity to evolve, adapt and include local communities in working with institutions to build networks that are able to withstand future shocks from hazard events? This requires the facilitation of positive transformations of relationships and practices within the social unit or system. What is integral to the success of such a transformation is the will and resources (including financial) to allow it to evolve. This requires a step change in how traditional 'protective' projects for disaster prevention and response are allocated their resources and the extent to which local communities are allowed to actively engage not just in the process but in the decision making. We recognise that this may be problematic but that in London for instance (deliverable, 5.5 – Heat-Wave Risk), simply talking to at risk communities brought out the varied and creative ways that vulnerable populations addressed risk as well as highlighting issues that may increase their vulnerability, such as their relative isolation. This provides an opportunity for further research that develops targeted and meaningful dialogues and exchanges of experience that inform Social Learning to become part of a transformational experience when building resilience.

But what about communities that have clear views about what is needed to become resilient to the hazards they face but are uncertain what to do about it? The case study on earthquake resilience in Turkey (deliverable 5.3) found that issues of trust

(communities not trusting their governments to enforce safely built structures), was a barrier to communities taking on board safety messages regarding how to prepare and respond to the earthquake risk. This was borne out by the relative importance given to a range of resilience indicators identified by the local community. Specifically, participants referred to earthquake awareness and education, earthquake-resistant buildings, preparedness and mitigation, moral values of community members, and fatalism and acceptance as characterizing community resilience. Examples of these along with selected quotes from the Turkey study are included below, with the threats and opportunities for enabling these communities to develop their own form of resilience is offered, alongside recommendations for future social learning.

In the Turkey case-study earthquake awareness and education was by far the most pronounced characteristic of resilient communities as it was reported by about one third of the participants. These participants seemed to agree that communities would be resilient to disasters to the extent that they had awareness and education on earthquake-related issues. These issues included the seismic risk of the region, preparedness measures for individuals and households, quake safety of buildings and neighbourhoods, and knowing what to do during an earthquake. For instance, the 38-year old male academician (#3) emphasised that earthquake awareness at the individual level was important for resiliency of communities to earthquakes. He explained:

> *One should be aware, first and foremost. One should know that it is the building, not the earthquake that kills. One should know how to behave in a possible earthquake. Or what to do if trapped under collapsed buildings. If you know these first survival measures, others will come to your aid one way or another, but first you need to have a preparedness mentality. If you live in an earthquake zone, you need to be aware. Of course, the organizations matter but first you need to be aware.*

Another participant, the 48-year old male local media employee (#7), further noted that awareness and education on earthquake-related issues should encompass all segments of the community, especially children. He reported:

> *People should always keep the earthquake in mind. We should form a continuous awareness about the issue. Starting with primary education... And*

we should always remind people the suffering earthquakes may cause. Most importantly, we need to elect officials with high earthquake awareness. Unfortunately, the public does not have that kind of sensitivity and mentality. We need to raise awareness, starting with children. And this awareness should be more than what to do when earthquake hits, but how to be prepared beforehand. Like building stronger buildings rather than stabilizing furniture to walls or telling people to get under a table when earthquake happens.

Having earthquake-resistant buildings, reported by about one third of the participants, was also perceived as characterizing resilient communities. As the 50-year old female teacher (#10) said:

The most important thing is the building you live in. If you live in a sturdy building, you are not afraid of the earthquake. Buildings kill, not the earthquake. Earthquakes happen in Japan, ones that are of higher magnitude, all the time but no one dies. I think it's a requirement in capitalism, you build cheap and sell expensive. If you say "God will protect us" and if your control mechanism is weak, then you may build weak buildings. I'm not in the construction business, but I think this is the situation here. In those times, people said they used sea sand in constructions, especially in Yalova [a city in the Marmara region that was affected by the 1999 earthquake].

Preparedness and mitigation, though less pronounced than earthquake awareness and education and earthquake-resistant buildings, was also reported to be a characteristic of resilient communities. According to four participants, communities that take necessary preparedness and mitigation measures (e.g. drills, education, physical measures, equipment, etc.) for earthquakes would be resilient. The 43-year old imam (religious functionary) (#4) emphasized the importance of preparedness and mitigation for community resilience as follows:

God knows there will be earthquakes here, so we should always be prepared. And we shouldn't be shocked when it happens, because it is known by God. If we are prepared, we can say "we were expecting it and it happened" and get on with our lives. And you should put preparedness to action. First tie your camel, and then pray that it won't wander off. We should be prepared not only in thought, but in action, too.

Moral values of community members, and fatalism and acceptance were also mentioned by the participants, though rarely, as characterizing resilient communities.

In regards to moral values of community members, having moral values for honesty and rightfulness, especially among building contractors, was perceived as contributing to resilience of communities to earthquakes. As for fatalism and acceptance, communities with faith and fatalistic attitudes were viewed as being resilient to communities. The 43-year old imam (#4) explained:

> *We must accept that we will have earthquakes. People should accept the earthquake. After accepting, we should always be prepared, because it is known by God. And there is the concept of fate, if we are prepared, loss and death that happened comes from God, we need to accept that in order to cope. Otherwise, you cannot cope with it if you say "Why did this happen to me?".*

One of the big challenges arising from the Turkey case study is the wide number of views regarding key indicators of a resilient community. Furthermore, although opportunities for sharing these views occurred as part of the interview process making up the empirical component of the case study, the opportunity for community discourse and social learning is not evident. Some of the participants appear to be disconnected from current economic, social and political discourses. For example, preferring instead to focus on the future with resilience being born from a new generation of educated planners and builders who might have a stronger moral compass with regard to structural mitigation of buildings in at-risk areas. This is concerning, because it limits *current* engagement with resilience via thought, behaviour or action at this time. Furthermore when coupled with a fatalism regarding earthquake risk and its impact there is very little impetus to do anything about it. This is where social learning can and should have a role in allowing communities to negotiate the problems they face, which when coupled with transformative learning practices can allow for problems to be thought about, reflected upon and new ideas, thoughts and actions tested.

Social Learning is also about building personal and group efficacy (the belief in one's ability to carry out a task). In particular, proxy and collective agency are said to occur as part of the social learning process. Proxy agency arises when "people do not have direct control over social conditions and institutional practices that affect their lives" (Bandura, 2000, p. 75). This leads to individuals seeking to improve their well-being and security through a proxy agency who they believe have the expertise or the power to act on their behalf to achieve desired outcomes. This is an interesting

response to the value-action gap, suggesting that this may be a way to close it, but there is a danger that this also dilutes personal control and agency, allowing others to bear the responsibility (as in the Turkey case study) or take on board the stressors of such an undertaking, while losing out on the development of what Bandura calls *requisite competencies* (Bandura, 2000, p. 75). This proxy agency also tends to suit those with an external locus of control, which has been shown to be an inhibitor for behavioural change (Rotter, 1966; Ronan and Johnston, 2001) as these individuals believe external forces such as nature, luck or society have the dominant control over their situation.

However if there is a collective who share a perceived efficacy and believe that their chances of success outstrip their individual efficacy, this is a powerful motivator. This does not mean that they will not experience obstacles or hostility, but rather it is how they use their collective resources and tenacity when faced with such opposition to their aims that is an indicator of the usefulness of collective efficacy. Bandura argues that for such collectives, success is more likely if is “supported by resources, effort and staying power”, especially when: “collective efforts fail to produce quick results or meet forcible opposition” (Bandura, 2000, p. 76).

This is a key message to take away from developing social learning practices when attempting to understand how resilient communities can be nurtured. The process is not a quick fix or a vague way of engaging with communities at risk, but one that needs to be embedded within the culture of organisations, governments and communities in order to develop on-going learning that is itself adaptable and able to absorb shocks. It is, therefore, fundamental to future adaptation and resilience, especially with reference to the emBRACE framework. Without the inclusion of social learning and its applicability to managing, understanding and negotiating change brought about by potential and actualised shocks from disasters, it is unlikely that communities will learn to evolve beyond the current holding pattern of bouncing back, rather than bouncing beyond in order to become truly resilient.

7. CONCLUSION

This report explores how the challenges faced by communities at risk from environmental hazards might be tackled via the application of social learning practices. By outlining the theoretical framework for social learning a better understanding of its application for developing resilient communities has been

proposed. The mechanisms for triggering social learning were then outlined, with examples from flood and heat wave risk in the UK employed to highlight how this might be achieved. Gaps and further opportunities for learning and research were outlined, again supported with examples from the UK and Turkey. This provided context for enhancing understandings of the utility of social learning. Most notably, as a way of evolving resilience discourse and practice in order to mitigate the potential and manifest consequences of the disaster risks posed by environmental hazards, by adapting to changes, understanding the wider context and bouncing forwards.

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