

Assessing Community Resilience in North Cornwall

Local perceptions into responding to changing risk landscapes

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I certify that all material in this dissertation which is not my own work has been identified with appropriate acknowledgement and referencing and I also certify that no material is included for which a degree has previously been conferred upon me.



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Abstract

This study assesses the importance of five characteristics in building community resilience (CR) to multi-scalar risks from the perspective of two communities living in North Cornwall: place attachment; leadership; community cohesion and efficacy; community networks; and knowledge and learning. The current changing socio-economic and climatic Cornish context supports the relevance for testing existing assumptions in contemporary literature-bases on the above significance of characteristics for residents in Boscastle and Wadebridge. Similarly, an evaluation of how effective measurement approaches used are in generating learning considered useful for more meaningful dialogue on CR is included.

Quantitative and qualitative insights include moving beyond existing assumptions to show “place attachment” as the prime driver of CR processes based on community engagement and preparedness to live with uncertainty. However, limits are posed. Similarly, “leadership” is presented as holding the least relevance for CR, yet given emphasis through other applications. Likewise, improved social learning and more deliberative decision-making processes would strength resilience levels. Furthermore, Boscastle respondents perceive themselves to be more resilient overall, and more resilient in each CR characteristic compared to respondents in Wadebridge. Qualitative sources suggest effective historical capacity to self organise around a past crisis event including hints of the “inoculation effect”: enhanced individual psychological ability to cope better with a particular risk based on successful local responses to previous life experience of it.

Use of assessment tools present challenges for capturing CR characteristic complexities. How accessible quantitative findings are for decision-makers is debatable based on the utility of “resiliency scores.” Qualitative approaches indicate that the concept of CR is required to be operationalised in different ways to be useful. This supports assumptions on complementary mixed methods approaches for rigorous CR assessment.

Acronyms

ANOVA	One-way analysis of variance
CR	Community resilience
FGDs	Focus group discussions
KIIs	Key informant interviews
PA	Place attachment
SPSS	Statistical Package for Social Sciences

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1: Introduction

1.1 The research idea

Assessing the community resilience - multi-scalar risk nexus through a local subjective lens

Communities around the world are in transition (Wilson 2012a: 2). Dynamic drivers of socio-economic, environmental and climatic systems change are intensifying existing contextual vulnerabilities and constructing new, complex and multi-scalar landscapes of risk in which communities reside. Local contexts are becoming more uncertain with risks posed potentially falling outside the existing remit of historical experience (OECD 2009). Subsequently, community sustainability achieved to date may be undermined, and future objectives harder to achieve as factors important for responding to change today may or may not be relevant in the future (Amundsen 2014: 53). Moreover, communities cannot possess complete knowledge of the kind of changes to anticipate or to prepare for given the intensity and unknown ultimate impacts of them that reaches across scales (Magis 2010: 413). Moving towards strong resilience that supports present and future communities in meeting required needs is therefore likely to be increasingly challenging with profound consequences presented (WCED 1987; NRC 1999; Rockstrom et al. 2009; Raworth 2012; IPCC 2013).

How successfully a community addresses adversity and reacts to internal and external change is critical (Wilson 2012a). A community's ability to respond is influenced by its level of resilience (Magis 2010: 413). Since "social resilience" research came to the fore (Adger 2000), various definitions, concepts, viewpoints and voices have been attributed to community resilience (CR) in order to unpack this paradigm (Brown 2013).

This includes those from diverse disciplinary backgrounds such as disaster management (Norris et al. 2008; Sherrieb et al. 2012); psychology, mental health and well-being (Buikstra et

al. 2010; Ungar 2011); health (Kulig et al. 2008); social development (Cuthill et al. 2008), and environmental change (Cutter et al. 2008). Similarly, those highlighting contradictory assumptions that natural scientific frameworks emanating from the historical inception of resilience thinking (Holling 1973) can be applied to communities to begin with (Leach 2008; Kirchhoff et al. 2010; Hatt 2013). Lack of attention to agency and power (Cannon and Muller-Mahn 2010; Davidson 2010; Cote and Nightingale 2012; Beymer-Farris et al. 2012), subjective well-being (Brown and Westaway 2011), and values that connect communities to their environments have been raised (Berkes and Ross 2013).

Although various viewpoints exist, at large, CR refers to the “existence, development and engagement of community resources by community members to thrive in an environment characterised by change, uncertainty, unpredictability and surprise” (Magis 2010: 401), be it triggered by social, political or environmental causes (Adger 2000: 347). Moreover, it can be seen as supported by “a process linking a set of adaptive capacities to a positive trajectory of functioning and adaptation in populations after a disturbance” (Norris et al. 2008: 127).

While highly debated, adaptive capacity can be considered as the ability of a community to adapt to, recover from or moderate the effects of (climate) change and anticipate future occurrences (Smit and Wandel 2006). It therefore has the ability to influence CR (Folke et al., 2010; Adger et al. 2011b) as it is represented by a myriad of attributes (Carpenter et al. 2001; Olsson et al. 2004; Dessai and Hulme 2007; Nelson et al. 2010; Marshall et al. 2011, 2012), including resource availability (Tol and Yohe 2007; Levine et al. 2011), that are preconditions for adaptation (Nelson et al. 2007). Following on, adaptation can be understood as the process of responding to changes in conditions that affect communities, while resilience is the ability to adjust to these changes and to engage available resources (Amundsen 2014: 36). As indicated by these concepts therefore, it is widely agreed that CR is a dynamic and emergent process that involves changes over time rather than an observed outcome or desired end state to be achieved that can be measured at a particular point in time (Frankenberger and

Nelson 2013: 4).

Nevertheless, understanding “what” community resources and “which” sets of adaptive capacities shape, strengthen and build CR is vital (ibid). As government and institutional action alone is understood to be insufficient (Adger et al. 2013), it is considered that communities themselves are well served to strategically develop resilience at local level (Magis 2010: 413). This is particularly pertinent as resilience is complex. While community members in one geographical location may be exposed to the same risks, not all residents will necessarily have the same response to its impacts due to a dynamic mix of determinants that shape individual levels of resilience to different risk factors, as well as that of the community overall (Twigger-Ross et al. 2014).

Although still in its infancy in terms of development (Brand and Jax 2007; Davidson 2010), current research shows that CR is influenced by what is deemed important to people from their own perspective as they themselves are affected by change (O'Brien and Wolf 2010; Adger et al. 2011b, 2013). This in turn is informed by their understanding of the world they live in, how it is constructed and hence how individuals, and as a collective community, may respond to change based on specific attributes that are viewed as legitimate by them (Chambers 1970; Devine-Wright and Clayton 2010; Fresque-Baxter and Armitage 2012).

Although more research has focused on physical and objective components of resilience including infrastructure and economic analysis assessing capital risk to key assets, what people and communities perceive to be of value cannot necessarily be captured through these means (Adger et al. 2011a; Ungar 2011; Graham 2013). Identifying what is valued is of critical importance so that local responses to change can connect with subjective characteristics that are meaningful for communities themselves (Cohen et al. 2013; Adger et al. 2013; Amundsen 2014). This information can therefore support the development of effective and accountable investments, practices and policies that move towards building more sustainable, stronger and

safer communities who are engaged to strategically recognise, accept, build capacity for, and act in light of change (Magis 2010: 408). Furthermore, building meaningful resilience at local level is essential so understanding of “what works” can be scaled up to support policy traction at local, national and international levels (Rossing et al. 2014).

In light of the above, and although underdeveloped compared to ecological (Holling 1973; Gunderson and Holling 2002) and social-ecological resilience research (Folke 2006), exploring social and subjective dimensions of CR is necessary (Brown and Westaway 2011; Brown 2013). However, distinct knowledge gaps exist on the effective assessment of - what contributes towards and how to measure – resilience at local level (Cohen et al. 2013). Discrepancies exist surrounding what a potentially resilient community might “look like” and how it can be operationalised (Bahadur et al. 2013; Twigger-Ross et al. 2014). There is debate around “what” characteristics are important for CR, and important from community perspectives. Similarly, “how” are they to be measured so progress can be assessed and lessons learnt from evidence generated. In other words, what methodological tools and approaches can be used to capture and test the complexities of characteristics that shape CR? (Wilson 2012a).

These tensions can be contributed to the fact that the conceptual development and construction of CR is comparatively new (Berkes and Ross 2013: 6). It is generally agreed that the concept of CR is difficult to assess because the malleability and plasticity of the term means it is an ambiguous concept that is characterised by different disciplines in different ways for different interests (Brown 2013: 8). Likewise, there is a lack of reliable tools and little agreement on measurement methods to capture the relevant aspects of the ways in which communities interact and change (Twigger-Ross et al. 2014: 7) based on divergent viewpoints and weak methodologies that have contributed to a lack of clarity and consensus on ways of transferring CR from theory to practice (Bahadur et al. 2013: 62).

1.1.1 Community resilience characteristics

Nevertheless, health and developmental psychology research, followed by work on disaster, community development and self-organisation (Coulthard 2011; Brown 2012; Berkes and Ross 2013), has identified various characteristics influencing CR (Table 1 below).

Reference	Community resilience characteristics identified
Kulig et al. (2008, 2010)	Mentality; togetherness; community problem-solving; leadership; ability to cope with change; networks; getting along; ability to cope with divisions; expressions of a sense of community (pride, belonging); internal/external influences; community action in response to influences
Hegney et al. 2008 / Buikstra et al. (2010)	Social networks and support; positive outlook; learning; early experiences; environment and lifestyle; infrastructure and support services; sense of purpose; diverse and innovative economy; embracing differences; beliefs; leadership
Magis (2010)	Community resources; development of community resources; engagement of community resources; active agents; collective action; strategic action; equity; impact
Ross et al. (2010) / Gooch et al. (2010) / Maclean et al. (2014)	People-place connections; knowledge, skills and learning; community networks; engaged governance; diverse and innovative economy; community infrastructure
Norris et al. (2008) / Pfefferbaum et al. (2011) / Sherrieb et al. (2012)	Social capital (including place attachment; participation; social support/networks; linkages); information and communication; community competence (including efficacy, empowerment, political partnerships, taking action, critical reflection); economic development (hazard risk and vulnerability; equitable access to resources)
Amundsen (2012, 2013, 2014)	Community resources; networks; institutions and services; people-place connections; active agents; learning
Cohen et al. (2013) / Leykin et al. (2013)	Leadership; collective efficacy; place attachment; preparedness; social trust; social relationships

Table 1: Details of community resilience characteristics explored in recent research (adapted from Berkes and Ross 2013: 12-13 and updated by the author).

Although all of the above factors are shown to hold relevance for CR, certain dimensions have received particular attention due to assumptions that they significantly influence a community's ability to respond to change at both individual and community scale (Cohen et al. 2013: 1734). Correspondingly, the following characteristics warrant focus based on theories that they

should be taken into account in building CR (Amundsen 2014) and that further work will support movement from a set of assumptions to an evidence base (Maclean et al. 2014: 155).

1.1.1.1 Place attachment

Place attachment (PA) is identified as a significant attribute strengthening CR (Norris et al. 2008; Ross et al. 2010) as it is considered a motivating factor for adaptation (Amundsen 2013) based on its positive influence to maintain or enhance attributes of place that are valued (Vaske and Kobrin 2001; Steadman 2003).

Although defined in multiple ways across interdisciplinary fields (Lewicka 2011), it represents a mix of related yet diverse bonds people develop with physical places (Tuan 1974). These focus on the actor (who experiences the attachment); the psychological process (how affect, cognition, and behavior manifest in attachment); and the object and nature of place that the attachment is felt towards (Scannell and Gifford 2010: pps 2-5).

The contextual changes highlighted above are perceived to affect the physicality of a place, and its related meanings, identities and emotional bonds (Reser et al. 2011 cited in Devine-Wright 2013: 64). Inclusion of place is therefore identified as resulting in improved decision-making processes and policies, due to enhanced local relevance that is better received by community stakeholders (Scannell and Gifford 2010: 8).

However, PA can also potentially weaken CR (Scannell and Gifford 2013). This includes living in high-risk areas (Billig 2006); negation to accept new ideas and practices (Marshall et al. 2007; Dale et al. 2008; Devine-Wright and Howes 2010); and experiencing psychological trauma following disruptions to place (Fried 2000; Cox and Perry 2011; Devine-Wright 2013). This characteristic does therefore have potential limits in influencing adaptive capacity and hence strengthening CR (Marshall 2012).

1.1.1.2 Leadership

Although an “essentially contested concept” with no universal definition (Grint 2005), exploring leadership in light of CR is recognised as important (Longstaff and Yang 2008; Castleden et al. 2011; Wilson 2012b) for motivating change towards sustainability and in facilitating positive governance outcomes (Evans et al. in review: 3). Understanding how to foster effective leadership to address the “crisis of governance” has intensified with changing local contexts (Case et al. in review: 2).

Moving beyond normative stances presented in mainstream management science and leadership studies towards investigating how leadership emerges, evolves, or practically achieves results such as knowledge and trust building is needed (ibid: 10). Viewing leadership as a predominately positive characteristic, with governance failures attributed simply to an absence of leadership is no longer enough (Evans et al. in review: 14). Discussions surrounding “who” decides which leadership roles should be privileged, and across which scales should leadership authority be institutionalised and thereby legitimised is relevant (ibid). Similarly, which actors may support driving CR forwards. “Active agents” - individuals that undertake active leadership roles based on their belief in ability to create change yet are not necessarily linked to formal appointments (Magis 2010; Amundsen 2012) – are receiving more attention.

1.1.1.3 Community networks

This defining characteristic of a community (Piselli 2007) is seen as a foundation for building CR (Cohen et al. 2013). This follows the theoretical position where community networks are seen as the “glue” that keeps communities together by facilitating collective ability to goals mutually beneficial goals (Bourdieu 1987; Coleman 1988; Putnam 1995), including social trust (Poortinga 2011). This characteristic therefore represents different activities and processes that support and build collaboration between community members (Ross et al. 2010).

As community networks can take different forms - “bonding” (i.e. close ties within community groups that foster cohesion) or “bridging” (i.e. loose ties within groups that connect people that may not otherwise interact) (Magis 2010: 407) - the strength of an individual’s or a community’s network-base supports why certain stakeholders may be better placed to respond to crisis due to better embeddedness in networks that potentially support power, influence, identity, knowledge-building, and access to other opportunities including resources (Wilson 2012: 85; Linn 1999, 1982). However, when considering networks at community scale, challenges need to be acknowledged where resilience levels may vary according to opportunities that may be distributed unequally (Cannon 2008: 10). Consequently, any discussion on CR needs to ensure that the nuances of communities are recognised (Twigger-Ross et al. 2014: 48).

1.1.1.4 Community cohesion and efficacy

This characteristic is linked to that above as positively influencing community network-bases are shown to promote this attribute (Castleden et al. 2011). It also links to leadership; community efficacy and cohesion is likely to be enhanced through effective governance and institutional processes (Bahadur et al. 2010). Likewise, social learning promotes strong social cohesion (Adger et al. 2005: 1038) (see below). Furthermore, evidence indicates that a community’s historical capacity to self organise around an issue contributes to building resilience (Wilson 2012a). Yet, as above, illusions of “apparent cohesion and collaboration” are to be acknowledged in light of differences in power and agency (Cannon 2008: 13).

1.1.1.5 Knowledge and learning

In addition to access to and use of meaningful formal and informal knowledge sources, iterative, continuous and reflective learning is emphasised as key to a resilient system (Berkes, et al. 2003; Tompkins and Adger 2004; Bahadur et al. 2010; Adger et al. 2011a, Lopez-Marrero and Tschakert 2011). Also important is learning from past crisis (Buikstra et al. 2010; Magis 2010), and “social learning” (i.e. a community’s past and present learning

processes) that form “social memory”: “individual and community interpretations of information, reflections on previous experience, group discussion and established practices” (Jazeel and McFarlane 2010 cited in Wilson 2012: 82). Consideration of “quality” (how is learning passed on?), “scale” (who is learning and who benefits most from learning processes?) and successful encoding of knowledge so that it is available to community members over generations are also stated as vital (Osborne et al 2007; Oudenhoven et al. 2010 cited in *ibid*: 84).

Furthermore, assumptions surrounding legitimate knowledge formation, the shifting of boundaries between science and society, how policy makers exert authority and hence effective spaces for meaningful community participation and information flows between relevant stakeholders across scales need to be acknowledged so that the effectiveness of local behaviours is harnessed not reversed (Jennings 2009: 240; Kates et al. 2001; Clark 2007, 2010; Ostrom 2007, 2010; Berkhout 2010; O'Brien and O'Keefe 2010; Hart and Bell 2013).

1.1.2 The context: Community resilience in North Cornwall

Testing the above assumptions and assessing how important the above characteristics for resilience are perceived to be by communities residing in North Cornwall, south-west England, is relevant. More houses, community assets and coastal protective infrastructure incurred damaged in this county compared to anywhere else in the UK during the 2013/14 winter storms (Owens, pers comms. 19 March 2014). Cornwall experienced the most intense storms for 52 years, the heaviest rainfall episodes in 250 years combined with tidal surges and spring tides that culminated in extensive flooding across the county (*ibid*; The Guardian 2014a). Moreover, these impacts are set against a background of severe socio-economic and environmental costs resulting from extensive flooding in Boscastle in 2004, together with further floods across the middle of Cornwall in November 2010 (BBC 2004; Met Office 2004; The Guardian 2010).

However, climatic change does not operate in isolation of a broader set of factors. Regional institutions view socio-economic vulnerabilities of national government cuts on flood defence budgets (The Guardian 2014b), climate model limitations for the specific Cornish context required in part to support effective planning, combined with existing top-down approaches to community engagement as contributing to awareness of the need for more meaningful approaches for CR (Owens, pers comms. 19 March 2014). The Cornish context therefore reflects the wider UK setting where an increased focus on CR is stated as necessary (Pitt Review 2008; DEFRA 2010). Many communities, particularly in coastal regions, are becoming more susceptible to changing contexts and less able to rely on existing potentially unsustainable and non-resilient approaches to community development (Twigger-Ross et al. 2014: 81).

Correspondingly, research is increasingly focusing on CR to flood risk in Cornwall (CCFF 2013). However, it is predominantly focused on preparedness measures (Loades 2013). There is a lack of evidence on subjective characteristics communities perceive to be important for building resilience at large, as well as on the specific selected characteristics above. Likewise, there is lack of CR assessment to multi-scalar risk, not just flood risk.

Following on, the above suggests that CR is influenced by selected characteristics. How important a community perceives these characteristics to be may depend in part on the local context of risk as each community structure is unique (Leykin et al. 2013: 314). Moreover, it is stated that for “resilience” to be “useful,” it is important to assess whether communities can be resilient before (preventative) and after (recovery) a hazard occurs (Cannon 2008: 1).

Communities in the rural coastal village of Boscastle, and the market town of Wadebridge just inland on the Camel River estuary, North Cornwall (figure 1 below), present attractive cases based on the diverse risks faced in each location (see sections 3.2.1.3 and 3.2.2.3 below) and on differentiated experiences of a “crisis” event that may influence perceptions on CR.

Although flooding is a regular event in Boscastle and indigenous Cornish have a long history of adapting to it (Jennings 2009: 240), as stated above, residents experienced substantial flooding in 2004 due to multiple factors that reflect in part selected CR characteristics above, including lack of local knowledge in risk policy-making (ibid). Yet, evidence shows that residents in Wadebridge have not experienced a shared “crisis” event to date (see section 3.2.2 below). However, as discussed, consideration of the above characteristics in building CR is indicated as apt.

This gives rise to the following:

1.2 Aim and objectives

1.2.1 Research aim

To assess CR to multi-scalar risks through a subjective lens in Boscastle and Wadebridge, North Cornwall.

1.2.2 Research objectives

1. To test how important five characteristics are in constructing CR according to local perceptions in selected study sites (i.e. “what” to measure for CR) (figure 2 below):

- i) PA
- ii) Leadership
- iii) Community cohesion and efficacy
- iv) Community networks
- v) Knowledge and learning

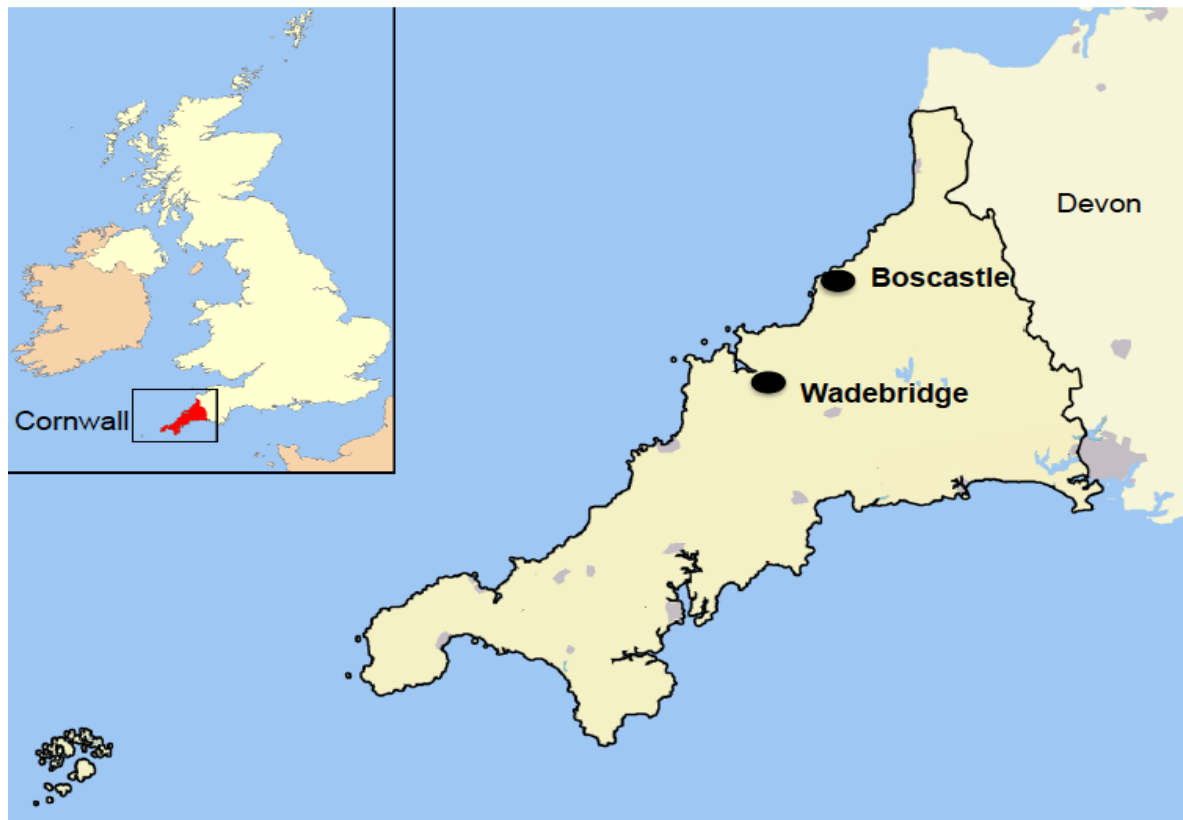


Figure 1: Location of Boscastle and Wadebridge, North Cornwall, south-west England.



Figure 2: Community resilience characteristics selected for assessment with “geographically bounded” communities under analysis in this study.

2. To explore the effectiveness of the methodology used to assess the above CR characteristics in order to evaluate how useful different assessment tools and approaches are (i.e. “how” to measure it).

1.3 Relevance of the research

Existing theoretical models of CR have not “progressed to the operational stages where they effectively measure resilience at the local level” (Cutter et al. 2008: 604). In response, this research aims to move beyond a theoretical framework by assessing what shapes CR in practice through the investigation of community perceptions on selected resilience characteristics at local scale (Leykin 2013: 314). Moreover, more focus is required on the development of methodologies and suitable tools that assess CR (Steiner and Markantoni 2013). This study gives attention to this by operationalising latest CR assessment tools to gain insights into their effectiveness, including exploring what quantitative and qualitative methods suggest about the research topic.

1.4 Research scope

The assumption that resilient communities are characterised by equally well-developed economic, social (including cultural and political) and environmental capitals is understood (Wilson 2012a: 23). This study does not propose that the CR characteristics selected present a “complete” conceptual model of CR. Neither does it assume that they are the only characteristics within the social and subjective resilience remit. Rather this study presents community perceptions on selected resilience characteristics posed as important for further study in relevant literature-bases above, coupled with the author’s understanding of their relevance for the research context in question. Moreover, this study is not presenting an accepted “standardised” CR measurement framework (Frankenberger and Nelson 2013).

1.5 Structure of the study

Chapter 1: The research inquiry presenting the importance of CR assessment to multi-scalar risks through a local subjective lens is given. Details of CR characteristics analysed throughout this study in the context of two diverse communities in North Cornwall where research was undertaken is included. The research aim and objectives, relevance and scope follow.

Chapter 2: Research methodology, data collection approaches and analysis techniques used are discussed. Research challenges faced and ethics undertaken are also included.

Chapter 3: Quantitative and qualitative data collected providing insights on the perceived importance of selected CR characteristics from respondents' viewpoint is presented.

Chapter 4: A critical analysis of the above results is provided. This includes reflections on the perceived importance of CR characteristics assessed, as well as what the different data collection methods utilised reveal about the subject.

Chapter 5: Overall conclusions are offered.

2: Methodology and Research Design

2.1 Research design principles

This study follows a structuralist approach and a positivist social science paradigm. Precise methods to gather empirical data were used in an attempt to uncover “truths” about the importance of selected CR characteristics from respondent perspectives (Lather 1991: 7; Guba and Lincoln 1998: 203). Methods to collect data aimed to explore and improve on existing understandings through a predominantly deductive approach that used a hypothesis to test a pre-determined theory (Walliman 2006).

2.2 Methods of data collection

Complementary mixed methods using quantitative and qualitative approaches, and primary and secondary data collection were employed. This “strong approach” for assessing CR (Forbes 2009; Wilson 2012) presents different narratives that support a “thicker” (Adger et al. 2003) and “more comprehensive picture” (Amundsen 2014: 43).

2.2.1 Primary data

Primary data was collected by the author, with support from the MAGIC project (see section 2.2.1.2 below), in Boscastle and Wadebridge, North Cornwall, UK, from June 10 to July 15 2014. Quantitative data collection methods comprised of a 5-point Likert scale survey of 37 items to elicit ordinal level ratings on selected CR characteristics from residents living in selected field sites at both individual and community level (Appendix 1). This was based on the recognition of the differentiation between these scales and that proposed components at both levels can support the construction of CR (Steiner and Markantoni 2013: 5). Similarly, a significant number of scale items were used to enhance the accuracy of assessment (Field 2013). Moreover, as constructs of selected CR characteristics are not directly measureable (Pallant 2013), using and adapting validated versions of Likert scales presented in recent

relevant literature informed survey development (Table 2 below). The author's own input based on literature review findings also contributed.

Scale	Reference
Place attachment	Lewicka (2008); Cohen et al. (2013); Leykin et al. (2013)
Leadership	Pfefferbaum et al. (2011); author's own input
Community cohesion and efficacy	Cohen et al. (2013); Leykin et al. (2013); Pfefferbaum et al. (2011); author's own input
Community networks	Pfefferbaum et al. (2011); author's own input
Knowledge and learning	Pfefferbaum et al. (2011); author's own input
Personal and community levels of resilience	Cohen et al. (2013); Leykin et al. (2013)

Table 2: Details of scales included and adapted by the author in community resilience assessment survey design.

Moreover, in addition to providing quantifiable outputs, the survey gained broader insights into respondent perceptions that could guide qualitative data collection (see below). This included elicitation of general risks faced by respondents, enabling local socio-economic and environmental context specificity to be explored; and the capture of respondent thematic meanings on CR using free word association (after Devine-Wright and Howes 2010; see Appendix 1 survey Q40). All questions asked and terminology used was framed by language understood by respondents.

The survey was pilot-tested four times with the author's intended sample before research began. This assessed respondent understanding, ease of response, effectiveness of questions asked, and to unearth any additional issues. Minor changes were made post pilot-testing.

Qualitative data collection methods comprised of focus group discussions (FGDs). This elicited a deeper understanding of the perceived significance of quantitative data collected

(Frankenberger and Nelson 2013). It also enabled the author to ground truth initial interpretations of evidence made. FDGs were facilitated with 7 residents in Boscastle and 4 in Wadebridge who had completed the survey. Participants were selected based on availability and interest. Yet, it was ensured that diversified socio-demographic groups, sampling sectors (see below) and both “locals” and “incomers” (Jennings 2009) were included. The same question guide was used in both FDGs (Appendix 2). FDGs were audio recorded and transcribed. In addition, background information relating to perceptions of key regional institutional agents of change relating to CR in field sites were shared with the author courtesy of KII findings from the MAGIC project (Appendix 3).

2.2.1.1 Sampling

The overall sample comprised of 57.6% women and 42.4% men, giving a total of 170 respondents engaged in the study via door-to-door random sampling. To ensure as fair a representation as possible of the total number of inhabitants in each field site, 70 surveys in Boscastle (out of a total of 345 households (OCSI 2009a from Census 2001)) and 100 surveys in Wadebridge (out of a total of 2,724 households (OCSI 200b from Census 2001)) were administered with every third household where feasible.

Although this research assesses community resiliency to multi-scalar and not specific risk, the author was aware that flooding posed a major risk in both study sites. Flood risk maps courtesy of the Environment Agency (Appendix 4) were used to ensure that over sampling in one particular area of the community did not occur to support research validity. These maps highlighted three sectors of community where surveys were undertaken with equal numbers of residents where possible: (a) households within the flood zone; (b) households within the flood zone and who have experienced past flooding (Boscastle only); and (c) households outside of the flood zone.

2.2.1.2 Community selection

In addition to the discussion in section 1.1.2 above, communities in Boscastle and Wadebridge were also selected due to collaboration with a project implemented by the University of Exeter: "Multi-scale Adaptations to Global Change, Impacts on Vulnerability in Coastal Areas" (MAGIC).

2.2.2 Secondary data

Relevant interdisciplinary peer review journal articles, institutional policy documents, international research projects and other grey literature were systematically appraised to present a contemporary and comprehensive review on CR. This informed conceptual understandings of the subject at large, and provided a valid foundation both theoretically and operationally for the selection of CR characteristics explored during fieldwork.

2.3 Methods of data analysis

2.3.1 Quantitative analysis

The Statistical Package for Social Sciences (SPSS; version 21) was used for analysis of quantitative evidence. Table 3 below outlines the statistical techniques used that reflect complexity thinking: information that characterises complex systems like CR is relational (Richardson and Cilliers 2001). Statistical methods used therefore largely focus on comparative relationships between community resilience characteristics and associated variables.

2.3.2 Qualitative analysis

Manual coding was undertaken to systematically analyse the different qualitative data types collated (focus group discussion transcripts and open-ended question survey data), and the coded text itself. A deductive approach (Bauer et al. 2000; Miles and Huberman 1994) was used for fact indication (Kelle 2000) that aided the organisation of data into meaningful

Table 3: Summary of main statistical techniques used in SPSS (version 21) to address dissertation aim and objectives.

Purpose	Research question	Parametric statistic technique used	Non-parametric statistic technique used	Reason for use
Exploring differences between groups (comparing groups) and exploring overall characteristics of sample	To what extent do respondents perceive community resilience characteristics overall, as well as in each field site? I.e. To what extent is each community resilience characteristic perceived by respondents to be 'active' or operationalised both across and within Boscastle and Wadebridge?	One-way Analysis of variance (ANOVA)	None	This test will show which community resilience characteristic is perceived to be the most important for all respondents, as well for respondents in Boscastle and Wadebridge separately.
Exploring differences between groups (comparing groups)	Is there a significant difference in the mean scores of perceived community resilience characteristics for respondents in Boscastle and Wadebridge? I.e. What is the statistical importance of each community resilience characteristic score in comparison with other characteristics? Are results likely to not have occurred by chance? And, if there is difference in importance between characteristics, is there a trend in connection between them?	Independent Samples T-test Correlation Coefficient (pairwise comparison)	None	The Independent Samples T-test will examine any statistical significant differences between perceived community resilience characteristic scores as perceived by respondents in Boscastle and Wadebridge. The Correlation Coefficient (pairwise comparison) will present a trend showing the connection between the significant differences of community resilience characteristic scores above, if any.
Exploring differences between groups (comparing groups)	Is there a significant difference in community resilience characteristics and perceived personal levels of resilience for respondents in Boscastle and Wadebridge? I.e. Do specific community resilience characteristics influence respondents' perceived personal levels of resilience?	One-way ANOVA	None	This test will show whether there are significant differences in the mean scores of perceived personal levels of resilience (dependent variable) across all five community resilience characteristics (independent variable) in Boscastle and Wadebridge.

Exploring differences between groups (comparing groups)	Is there a significant difference in community resilience characteristics and perceived overall community resilience levels for respondents in Boscastle and Wadebridge? I.e. Do specific community resilience characteristics influence respondents' perceived level of overall community resilience?	One-way ANOVA	None	This test will show whether there are significant differences in the mean scores of perceived community levels of resilience (dependent variable) across all five community resilience characteristics (independent variable) in Boscastle and Wadebridge.
Exploring differences between groups (comparing groups)	Do respondents in Boscastle differ in terms of their perceived personal levels of resilience compared to respondents in Wadebridge? Do respondents in Boscastle have higher levels of perceived personal resilience than respondents in Wadebridge?	None	Mann-Whitney U Test	This test will show differences between respondents in Boscastle and Wadebridge (two independent groups: categorical variables) and perceived personal levels of resilience (ordinal variable) by comparing scores and converting them on the ordinal variable to rank across the two groups.
Exploring differences between groups (comparing groups)	Do respondents in Boscastle differ in terms of their perceived overall community level of resilience compared to respondents in Wadebridge? Do respondents in Boscastle have higher levels of perceived community resilience than respondents in Wadebridge?	None	Mann-Whitney U Test	This test will show if any differences exist between respondents in Boscastle and Wadebridge (two independent groups: categorical variables) and perceived levels of community resilience (ordinal variable) by comparing scores and converting them on the ordinal variable to rank across the two groups.
Exploring differences between groups (comparing groups)	Is there a significant difference in the mean scores of perceived levels of personal resilience for males and females in Boscastle and Wadebridge? I.e. Do males or females in each field site perceive higher or lower personal levels of resilience?	None	Mann-Whitney U-Test	This test will show if any differences exist between the mean scores of male and female respondents in Boscastle and Wadebridge (two different groups of respondents) and their perceived levels of personal resilience (ordinal variable).

Exploring differences between groups (comparing groups)	Is there a significant difference in perceived personal levels of resilience and different age ranges of respondents in Boscastle and Wadebridge? I.e. Is there a difference between respondents who vary in age and perceived levels of personal resilience?	None	Kruskal-Wallis H-test	This test will compare scores of perceived individual levels of resilience (dependent variable) between six respondent age group categories (independent variable).
Exploring differences between groups (comparing groups)	Is there a significant difference in perceived personal levels of resilience for respondents in Boscastle and Wadebridge who are engaged in different categories of employment? I.e. Is there a difference between respondents who are employed, unemployed, students, retired or those looking after home/family and perceived personal levels of resilience?	None	Kruskal-Wallis H-Test	This test will compare scores of perceived levels of personal resilience (dependent variable) across six employment status groups indicated by respondents (independent variable) to see if any differences occur.
Exploring differences between groups (comparing groups)	Is there a significant difference in perceived personal levels of resilience for respondents in Boscastle and Wadebridge who define their economic status as much less than average, less than average, about average, more than average or much more than average? I.e. Is there a difference between respondents across five different levels of economic standing and personal levels of resilience?	None	Kruskal-Wallis H-test	This test will compare scores of perceived levels of individual resilience (dependent variable) between five different determinants of economic status (independent variable) to investigate if any differences occur.
Exploring relationships (between variables)	Is there a significant relationship between the length of time respondents have resided in either Boscastle or Wadebridge and perceptions of personal levels of resilience?	None	Spearman's Rank Order Correlation (rho)	This test is the correlation coefficient for ordinal data that will assess the strength and direction of the linear relationship between two variables: length of time respondents have lived in their community and personal perceived levels of resilience.
Checking reliability of survey used	Is there internal consistency reliability of the Likert scale used to inform this research? I.e. Do the Likert items used on the survey to construct each community resilience characteristic measure the same attribute?	Cronbach's Alpha Coefficient	None	This test will assess the internal consistency and reliability of the Likert scale used. As the survey comprised of more than 10 Likert scale items, it was feasible to obtain a decent Cronbach Alpha value (Pallant 2013: 104).

categories for reflection (Bernard 2011). This was supplemented by inductive coding to support empirical rigour. This allowed flexibility and author openness to certain nuances within perceptions highlighted (Lincoln and Guba 1985; Strauss 1987; Strauss and Corbin 1990). The author's own methods were used to present results.

2.4 Research challenges

As highlighted above, challenges were presented for the author as it is widely agreed that the concept of CR is difficult to operationalise and assess (Cumming et al. 2005; Resilience Alliance 2007; Bahadur et al. 2013). It is debated if resilience can be applied to the community level to begin with (Cannon and Muller-Mahn 2010). The notion of a “community” is also contested with no conventionally agreed definition for the term (Morcrette 2009; Neal 2009; Staeheli 2008). Still, this study assumes that a “geographically bounded community” exists: a group of people residing in a particular geographical location (Nasar and Julian 1995 cited in Scannell and Gifford 2010: 4). This does not mean that this study idealises the concept of community (Cannon 2008: 13).

Likewise, analysing quantitative research for the first time was challenging. This included the potential bias of using a 5-point Likert Scale that may be subject to (unintended) distortion from respondents, with the mid-way response was difficult to interpret (Marshall et al. 2014: 89). Moreover, some questions asked were not “easy” to answer. Various residents stated that certain answers did not fit “neatly” into only one response option. Consequently, it was acknowledged that a “full” assessment of selected CR characteristics is hypothetical, as questions asked were not always fully answerable (Wilson 2012: 49).

Similarly, a challenge was presented regarding research validity and the unit of analysis for determining resilience: asking *individual* perceptions about *collective* attributes of resilience at *community* level. It is understood that PA is the only CR characteristic being assessed that

can be perceived at individual level (Quinn, pers comms. 19 May 2014). The author was thus aware of possible assumptions regarding “nested hierarchies.” While resilient individuals and households can be perceived as the foundation for resilient communities, resilience at one level does not automatically result in resilience at higher levels (Frankenberger and Nelson 2013: 12). Resilient individuals therefore do not necessarily result in resilient communities.

Lastly, the author acknowledged challenges in their role as a researcher in regards to positionality and the situatedness of knowledge (Rose 1997 cited in Amundsen 2014: 49). The author’s position in defining and shaping research outcomes through fieldwork questions asked and approaches used, the means of analysis and the drawing of conclusions was noted (Klein 2004).

2.5 Ethical considerations

False expectations of research outcomes were addressed by voicing clear intentions and conditions under which the study was to be administered to respondents before fieldwork began. The right to not participate was adhered to, and for those that chose to contribute to this research, time given was subject to respondent discretion to ensure employment and household activities were respected. All FGDs were recorded with permission.

3: Results and Data Collection Findings

3.1 Quantitative results

3.1.1 Respondent profile: Boscastle

70 respondents formed the sample: 55.7% women and 44.3% men ranging in age from 18 to 65+ years. Most were aged 65+ years (37.1%) and the least 25 to 34 years (4.3%). Respondents were married (57.1%), single (17.1%), widowed (17.1%), or separated/divorced (8.6%).

Most were employed (52.9%) or retired (38.6%). However, others were students (4.3%), unemployed (1.4%) or respondents that have made another choice (2.9%). Respondents are educated to degree level (44.3%); hold other vocational/other qualifications (18.6%); attained GCSEs (17.1%), A-Levels (12.9%) or none of the above (7.1%). Most respondents classed their individual economic status as about average (57.1%), more than average (24.3%), less than average (14.3%), much less (2.9%), or much more (1.4%).

Respondents felt their greatest connection to their community was family (45.7%), friends (30%), work (14.3%); engagement with a faith-based organisation (2.9%); location (5.7%); or school (1.4%). The average length of time all respondents have lived in Boscastle is 21 years.

3.1.2 Respondent profile: Wadebridge

100 respondents formed the sample: 59% women and 41% men. Most were also 65+ years old (42%), but the least were aged 18 to 24 years (6%). Respondents were married (51%), single (21%), widowed (13), separated or divorced (12%), or cohabiting (3%).

Respondents were either employed (51%), retired (41%), students (3%), looking after home and/or family (3%) unemployed or another choice (both 1%). Most held degrees (35%), or

GCSEs (19%), plus other vocational/other qualifications (16%), A-Levels (15%), or none of these (15%). Respondents had an individual economic status of about average (46%), more than average (26%), less than average (15%), much less than average (12%), or much more (1%).

Respondents felt the greatest connection to their community was friends (37%), family (35%), work (18%); schooling (4%), alternate reasons (4%); faith-based organisation or civic club (both 1%). The average length of time all respondents have lived in Wadebridge is 20.5 years.

3.1.3 Respondent perceptions on community resilience characteristics

Evidence presents the extent that CR characteristics are perceived by respondents to be “actively operating” in each community. As selected CR characteristics are not directly measureable, respondent responses to Likert scale survey items have been averaged to provide an overall “score” that serves as a baseline measurement for each characteristic.

Results show that PA has the highest mean score of all CR characteristics and leadership the lowest. This result is the same for all respondents in the sample (Table 4 below), and when calculated separately in Boscastle (Table 5) and Wadebridge (Table 6 below).

Community resilience characteristics	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Place attachment	4,307	,042	4,224	4,390
Leadership	3,309	,046	3,219	3,399
Community cohesion and efficacy	3,944	,040	3,865	4,023
Community networks	3,816	,037	3,742	3,890
Knowledge and learning	3,615	,043	3,531	3,699

Table 4: Results of one-way ANOVA presenting mean scores of community resilience characteristics for all respondents (n=170).

Community resilience characteristics	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1. Place attachment	4,484	,049	4,387	4,581
2. Leadership	3,382	,070	3,243	3,521
3. Community cohesion and efficacy	4,105	,059	3,986	4,223
4. Community networks	3,911	,061	3,789	4,033
5. Knowledge and learning	3,878	,062	3,754	4,001

Table 5: Results of one-way ANOVA presenting mean scores of community resilience characteristics for respondents in Boscastle (n=70).

Community resilience characteristics	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1. Place attachment	4,183	,060	4,064	4,301
2. Leadership	3,259	,060	3,140	3,377
3. Community cohesion and efficacy	3,831	,051	3,729	3,933
4. Community networks	3,750	,046	3,659	3,841
5. Knowledge and learning	3,431	,051	3,330	3,533

Table 6: Results of one-way ANOVA presenting mean scores of community resilience characteristics for respondents in Wadebridge (n=100).

3.1.4 The importance of mean community resilience characteristic scores

Comparing the statistical significant difference in the above mean scores of perceived CR characteristics again confirms the same result for all respondents in the sample, and in Boscastle and Wadebridge separately: PA has the most statistical significance (with significance being $< 0,05$), and leadership the least. This means that the perceived “importance” of CR characteristics, according to respondents, can be ranked in the following order:

Perceived order of (statistical) importance	Community resilience characteristic
<i>First (most important)</i>	Place attachment
<i>Second</i>	Community cohesion and efficacy
<i>Third</i>	Community networks
<i>Fourth</i>	Knowledge and learning
<i>Fifth (least important)</i>	Leadership

Table 7: Results highlighting the statistical significant difference in mean scores of perceived community resilience characteristics for respondents overall, and in Boscastle and Wadebridge separately.

The trend of this result is presented in figures 3 and 4 below.

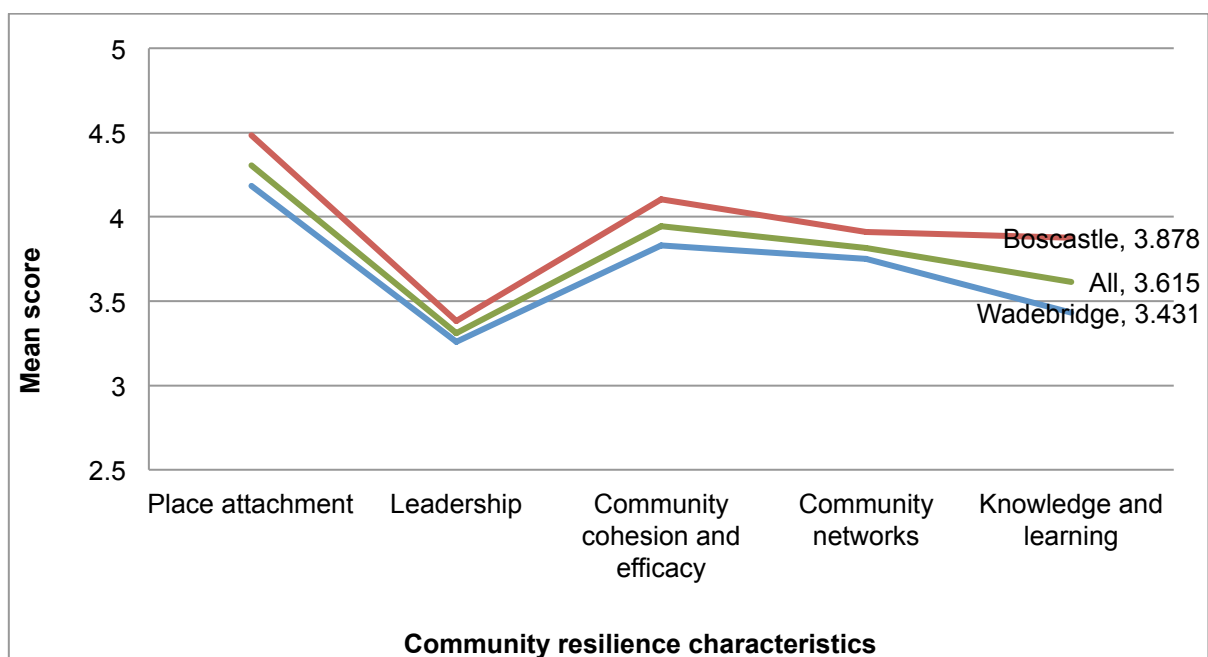


Figure 3: Results of the Correlation Coefficient (pairwise comparison) trend highlighting the “importance” of community resilience characteristic scores as perceived by respondents.

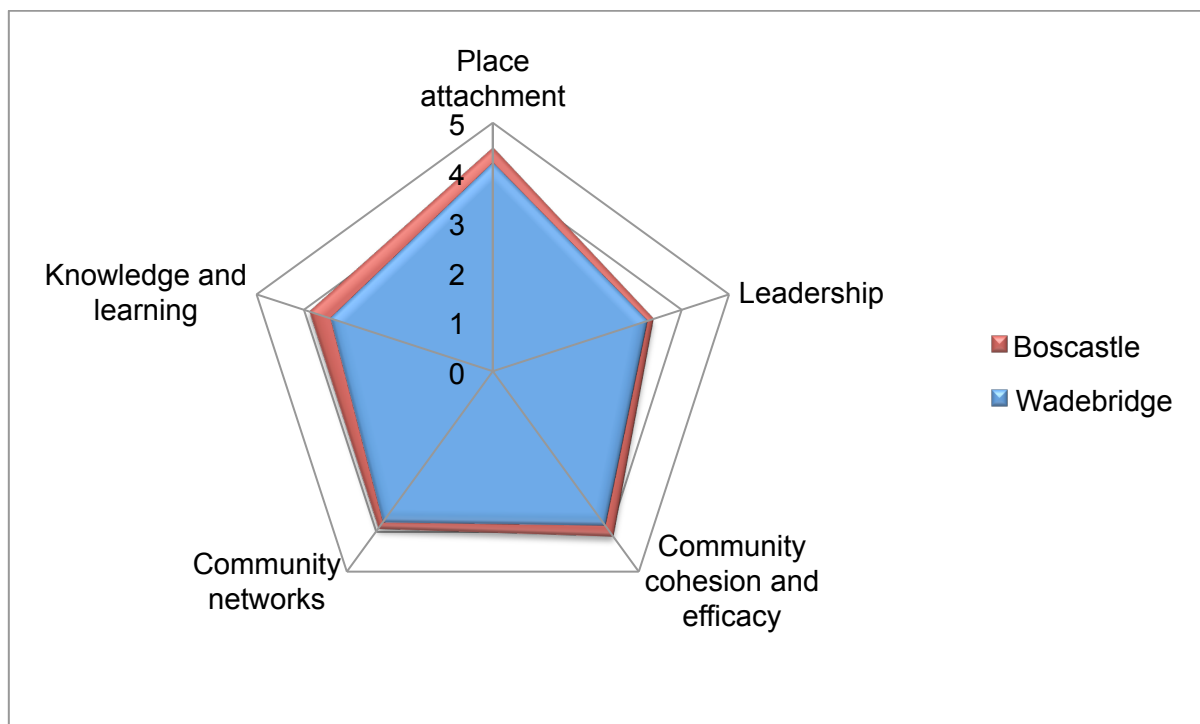


Figure 4: Results of the Correlation Coefficient (pairwise comparison) highlighting community resilience characteristic scores as perceived by respondents.

Assessing the statistical significant difference in mean scores between CR characteristics is valuable. It shows that the above results are not likely to have occurred by chance. However, evidence does show one discrepancy: there is *no* statistical significance between “community cohesion and efficacy” and “community networks” for respondents in Wadebridge (as emphasised in Table 8 below). This could indicate that the statistical significant difference between these two characteristics is more coincidental.

(I) factor1	(J) factor1	Mean Difference (I-J)	Std. Error	Sig. ^c	95% Confidence Interval for Difference ^c	
					Lower Bound	Upper Bound
1. Place attachment	2	,924 [*]	,067	,000	,732	1,115
	3	,351 [*]	,050	,000	,210	,493
	4	,433 [*]	,057	,000	,269	,596
	5	,751 [*]	,060	,000	,580	,922
2. Leadership	1	-,924 [*]	,067	,000	-1,115	-,732

	3		-,573 ⁺	,050	,000	-,715	-,430
	4		-,491 ⁺	,051	,000	-,638	-,344
	5		-,173 ⁺	,056	,026	-,333	-,012
3. Community cohesion and efficacy	1		-,351 ⁺	,050	,000	-,493	-,210
	2		,573 ⁺	,050	,000	,430	,715
	4		,081	,043	,480	-,043	,205
	5		,400 ⁺	,046	,000	,268	,531
4. Community networks	1		-,433 ⁺	,057	,000	-,596	-,269
	2		,491 ⁺	,051	,000	,344	,638
	3		-,081	,043	,480	-,205	,043
	5		,319 ⁺	,041	,000	,200	,437
5. Knowledge and learning	1		-,751 ⁺	,060	,000	-,922	-,580
	2		,173 ⁺	,056	,026	,012	,333
	3		-,400 ⁺	,046	,000	-,531	-,268
	4		-,319 ⁺	,041	,000	-,437	-,200

Table 8: Results of the Independent Samples T-test assessing the statistical importance of community resilience characteristic scores for respondents in Wadebridge.

Moreover, the trend in figure 3 above indicates that respondents in Boscastle perceive themselves to be more resilient than respondents in Wadebridge overall. Similarly, they perceive themselves to be consistently more resilient in each individual CR characteristic compared to Wadebridge respondents. Unpacking this scenario further is required in order to explore the robustness of respondent perceptions when assessing CR in light of other evidence collected.

3.1.5 Comparing levels of individual and community resilience

Following on therefore, a key question is: do respondents in Boscastle differ in terms of their perceived personal and community levels of resilience compared to respondents in Wadebridge? Are their perceived overall levels of individual CR higher?

Results reveal there *is* a statistically significant difference ($p < 0.05$) in perceived levels of personal resilience and in levels of overall CR between respondents in Boscastle and Wadebridge (as emphasised in Table 9 below). This means that respondents in Boscastle

perceive themselves to have higher levels of both personal resilience and overall resilience at community scale compared to Wadebridge respondents (as indicated by their mean rank values in Table 10 below). Figures 5 and 6 below show the trend of this result.

	My personal level of resilience is high.	My community's level of resilience is high.
Mann-Whitney U	2583,000	2113,500
Wilcoxon W	7633,000	7163,500
Z	-3,210	-4,895
Asymp. Sig. (2-tailed)	,001	,000

Table 9: Results of Mann-Whitney U Test showing a statistically significant difference between (i) perceived levels of personal and (ii) overall community resilience between respondents in Boscastle and Wadebridge.

	Field side	N	Mean Rank	Sum of Ranks
My personal level of resilience is high.	Boscastle	70	98,60	6902,00
	Wadebridge	100	76,33	7633,00
	Total	170		
My community's level of resilience is high.	Boscastle	70	105,31	7371,50
	Wadebridge	100	71,64	7163,50
	Total	170		

Table 10: Results showing respondents in Boscastle have higher levels of both (i) perceived personal and (ii) overall community resilience compared to respondents in Wadebridge.

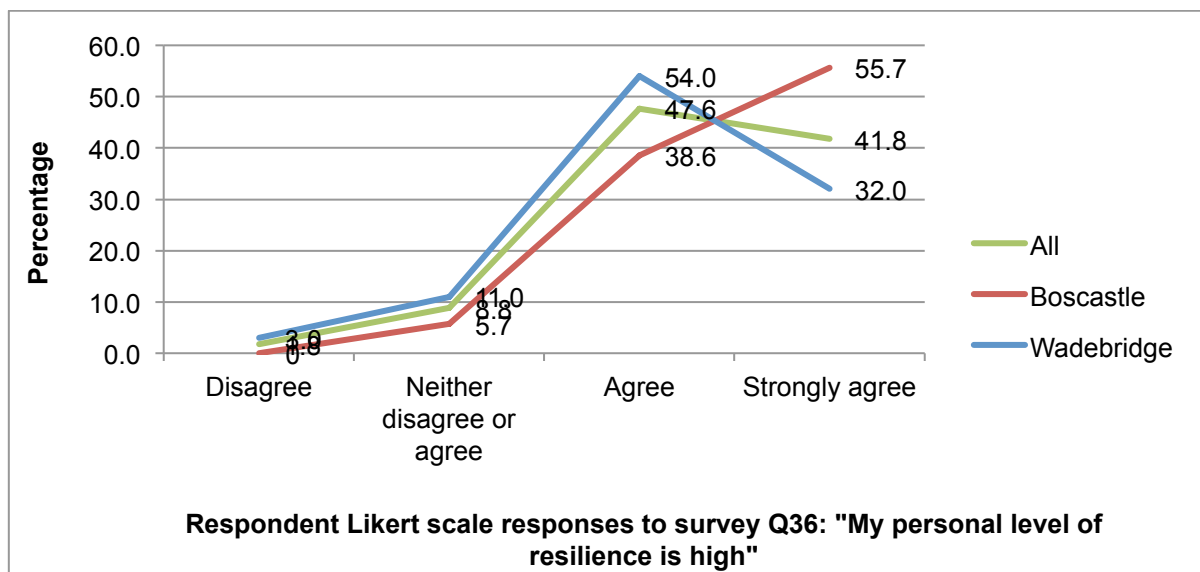


Figure 5: Trend highlighting respondent perceptions of higher levels of personal resilience in Boscastle compared to respondents in Wadebridge.

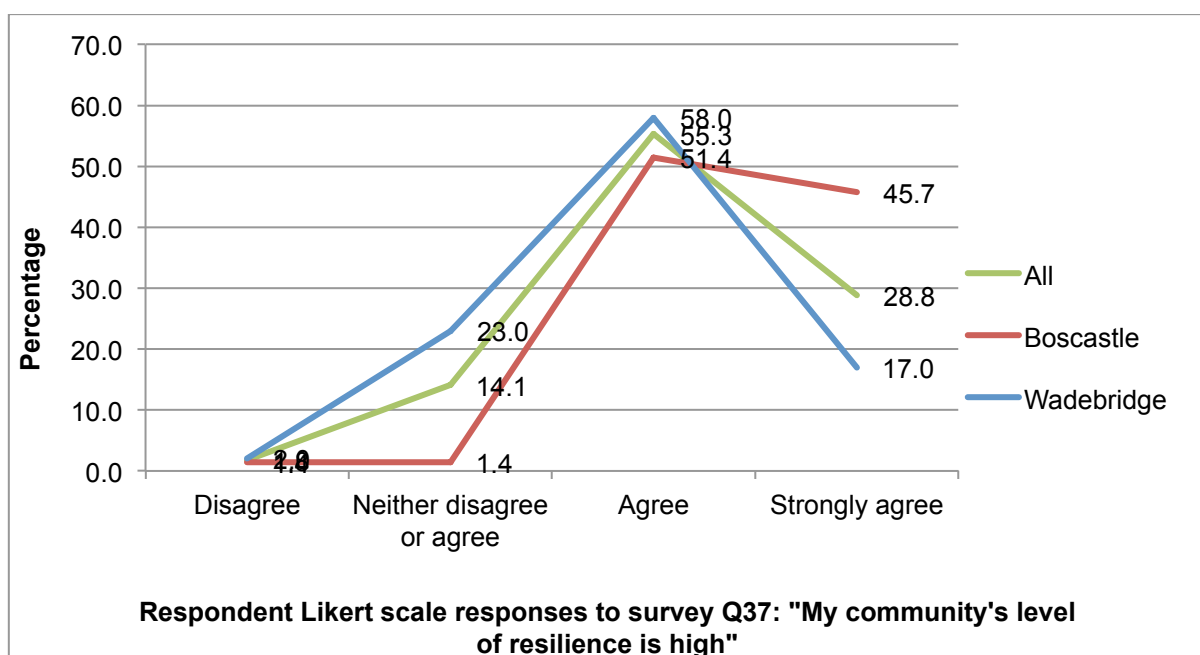


Figure 6: Trend highlighting respondent perceptions of higher levels of overall community resilience in Boscastle compared to respondents in Wadebridge.

3.1.6 Linking community resilience characteristics with individual resilience levels

Building on the above, as this study is investigating how important selected CR characteristics are according to respondents' perceptions, understanding which CR

characteristics, if any, have a stronger “link” to respondents’ perceived personal levels of resilience is useful.

Results show there is *no* statistical significant difference ($p < 0.05$) in perceived levels of importance of CR characteristics between respondents in Boscastle who perceive high levels of personal resilience, and those who perceive lower levels.

However, as emphasised in Table 11 below, there *is* one statistical significant difference regarding “PA.” Respondents, who perceive a high level of personal resilience, perceive PA to be more important compared to respondents with lower perceived levels of individual resilience.

Community resilience characteristics		Sum of Squares	df	Mean Square	F	Sig.
Place attachment	Between Groups	1,063	2	,531	3,423	,038
	Within Groups	10,403	67	,155		
	Total	11,466	69			
Leadership	Between Groups	,710	2	,355	1,048	,356
	Within Groups	22,707	67	,339		
	Total	23,417	69			
Community cohesion and efficacy	Between Groups	,630	2	,315	1,287	,283
	Within Groups	16,404	67	,245		
	Total	17,034	69			
Community networks	Between Groups	,687	2	,343	1,329	,272
	Within Groups	17,318	67	,258		
	Total	18,004	69			
Knowledge and learning	Between Groups	1,487	2	,743	2,948	,059
	Within Groups	16,892	67	,252		
	Total	18,379	69			

Table 11: Results of one-way ANOVA comparing scores of (i) respondents’ perceived personal levels of resilience and (ii) community resilience characteristics in Boscastle.

The results emphasised in Table 12 below present a different picture in Wadebridge. The difference between all five CR characteristics and respondents with high and low perceived

levels of personal resilience *are* statistically significant ($p < 0.05$). This means that respondents in Wadebridge with high levels of perceived resilience at individual level identify all CR characteristics to be more important than respondents with low levels of perceived personal resilience.

Community resilience characteristics		Sum of Squares	df	Mean Square	F	Sig.
Place attachment	Between Groups	3,125	3	1,042	3,079	,031
	Within Groups	32,482	96	,338		
	Total	35,607	99			
Leadership	Between Groups	3,714	3	1,238	3,735	,014
	Within Groups	31,825	96	,332		
	Total	35,539	99			
Community cohesion and efficacy	Between Groups	5,486	3	1,829	8,573	,000
	Within Groups	20,477	96	,213		
	Total	25,962	99			
Community networks	Between Groups	2,932	3	,977	5,193	,002
	Within Groups	18,068	96	,188		
	Total	21,000	99			
Knowledge and learning	Between Groups	3,214	3	1,071	4,572	,005
	Within Groups	22,499	96	,234		
	Total	25,713	99			

Table 12: Results of one-way ANOVA comparing scores of (i) respondents' perceived personal levels of resilience and (ii) community resilience characteristics in Wadebridge.

This therefore shows that respondents in Boscastle and Wadebridge are different. In Boscastle, respondents' perceived personal level of resilience to general risk is not statistically relevant compared to the overall perceived importance of all CR characteristics. Respondents with a high level of perceived personal resilience do however perceive PA to be more important compared to those with lower perceived levels of personal resilience. Alternatively, in Wadebridge, respondents' who perceive all CR characteristics as statistically more important possess higher perceived personal levels of resilience.

3.1.7 Linking community resilience characteristics with resilience at community scale

To further unpack the picture, the relevance of CR characteristics in relation to respondent perceptions on their community's overall level of resilience was assessed.

Results from Boscastle (Table 13 below) show there *is* a statistically significant difference ($p < 0.05$) between respondents who perceive their overall community's level of resilience to be high and all CR characteristics, except leadership. This means that those who believe their community's level of resilience is high, perceive PA, community cohesion and efficacy, community networks, and knowledge and learning to be more (statistically) important than leadership in building CR. This supports results presented in section 3.1.4 above.

Community resilience characteristics		Sum of Squares	df	Mean Square	F	Sig.
Place attachment	Between Groups	1,287	1	1,287	8,437	,005
	Within Groups	10,067	66	,153		
	Total	11,354	67			
Leadership	Between Groups	,948	1	,948	2,946	,091
	Within Groups	21,249	66	,322		
	Total	22,198	67			
Community cohesion and efficacy	Between Groups	1,183	1	1,183	6,185	,015
	Within Groups	12,626	66	,191		
	Total	13,809	67			
Community networks	Between Groups	,924	1	,924	4,385	,040
	Within Groups	13,903	66	,211		
	Total	14,826	67			
Knowledge and learning	Between Groups	1,571	1	1,571	6,928	,011
	Within Groups	14,970	66	,227		
	Total	16,541	67			

Table 13: Results of one-way ANOVA comparing (i) community resilience characteristics and (ii) perceived respondent levels of overall community resilience in Boscastle.

It is important to note that the two respondents in Boscastle who specified that they “strongly disagree” or “disagree” with survey Q37 (“My community’s level of resilience is high”) were not included in the above analysis. This is because the number of respondent responses for these categories was too small for appropriate analysis of variance (Pallant 2013: 58).

Results from Wadebridge are different. There *is* a statistically significant difference ($p < 0.05$) between respondents who perceive their community's level of resilience is high when compared to all CR characteristics, and those respondents who perceive their community to have low resilience (Table 14 below). This means that those who perceive their community's level of resilience as higher than other respondents believe that all CR characteristics are more important, including leadership.

Although different to Boscastle, this result still reflects that presented in section 3.1.4 above: the perceived importance of CR characteristics for respondents in Wadebridge shows that even though PA holds the most statistical importance and leadership the least, leadership is still considered to be important for building CR. The finding therefore confirms that Wadebridge respondents who perceive high levels of CR also perceive leadership to be relevant for resilience, along with all other characteristics.

Community resilience characteristics		Sum of Squares	df	Mean Square	F	Sig.
Place attachment	Between Groups	6,442	3	2,147	7,069	,000
	Within Groups	29,165	96	,304		
	Total	35,607	99			
Leadership	Between Groups	5,669	3	1,890	6,073	,001
	Within Groups	29,870	96	,311		
	Total	35,539	99			
Community cohesion and efficacy	Between Groups	8,127	3	2,709	14,580	,000
	Within Groups	17,836	96	,186		
	Total	25,962	99			

Community networks	Between Groups	4,253	3	1,418	8,127	,000
	Within Groups	16,747	96	,174		
	Total	21,000	99			
Knowledge and learning	Between Groups	6,434	3	2,145	10,680	,000
	Within Groups	19,279	96	,201		
	Total	25,713	99			

Table 14: Results of one-way ANOVA comparing (i) community resilience characteristics and (ii) perceived respondent levels of overall community resilience in Wadebridge.

In sum, the above results show that respondents in Boscastle perceive themselves to possess a higher sense of overall CR compared to Wadebridge respondents. They also perceive themselves to be consistently more resilient in each CR characteristic. However, when building resilience at community scale, respondents in Boscastle do not perceive “leadership” as relevant as other CR characteristics. Respondents in Wadebridge however do. Similarly, when building individual levels of resilience, respondents in Boscastle with perceived high levels of personal resilience, believe “PA” is more important than community members with lower levels of perceived personal resilience. In contrast, respondents in Wadebridge who perceive to possess a high level of personal resilience believe all CR characteristics to be more important than those with lower perceived levels of personal resilience.

In addition to the CR characteristics considered above, relevant literature-bases show that perceived levels of individual resilience may be influenced by other factors, including gender and age. An investigation of these factors will now be undertaken.

3.1.8 Gender and personal resilience levels

Much literature focuses on gender and consequential levels of resilience, especially lowered resilience levels for women in light of climate change risk (including Haines et al. 2006;

Arora-Jonsson 2011). An analysis of whether male or female respondents perceive higher or lower levels of personal resilience at individual scale was therefore undertaken.

Results show *no* statistically significant difference in perceived personal levels of resilience for males and females in Boscastle and Wadebridge (as emphasised in Tables 15 and 16 below). This means that men do not perceive their personal level of resilience to be higher than women or visa versa. This is supported by their mean rank values being almost identical in both field sites: 50.21 (females) and 50.91 (males).

	My personal level of resilience is high.
Mann-Whitney U	526.000
Wilcoxon W	1022.000
Z	-1.058
Asymp. Sig. (2-tailed)	.290

Table 15: Results of Mann-Whitney U Test showing no statistically significant difference in (i) perceived levels of personal resilience between (ii) male and female respondents in Boscastle.

	My personal level of resilience is high.
Mann-Whitney U	1192.500
Wilcoxon W	2962.500
Z	-.133
Asymp. Sig. (2-tailed)	.895

Table 16: Results of Mann-Whitney U Test showing no statistically significant difference in (i) perceived levels of personal resilience between (ii) male and female respondents in Wadebridge.

3.1.9 Age and personal resilience levels

There is also much literature on age and comparative levels of lowered or indeed raised levels of perceived resilience, especially for older adults (Heinz-Center 2002; Wolf et al. 2010; Wells 2010; Schwarz et al. 2011). An analysis of whether respondents of different age

perceive higher or lower levels of personal resilience at individual scale was therefore explored.

Again, results show *no* statistically significant difference between different respondents age groups and perceived levels of personal resilience in both Boscastle and Wadebridge (as emphasised in Tables 17 and 18 below as values are $p < 0.05$). This means therefore that the youngest (18 years old) and oldest (65+ years) respondents engaged in this research do not perceive their personal levels of resilience to be significantly different to that of other residents that fall in between this age range.

	My personal level of resilience is high.
Chi-Square	7.490
df	5
Asymp. Sig.	.187

Table 17: Results of the Kruskal-Wallis H-test showing showing no statistically significant difference between (i) perceived personal levels of resilience and (ii) different age groups of respondents in Boscastle.

	My personal level of resilience is high.
Chi-Square	2.562
df	5
Asymp. Sig.	.767

Table 18: Results of the Kruskal-Wallis H-test showing showing no statistically significant difference between (i) perceived personal levels of resilience and (ii) different age groups of respondents in Wadebridge.

3.1.10 Employment status and personal resilience levels

It may be assumed that people who are employed feel more resilient compared to those who are unemployed, or to those employed but gaining less employment benefits. This might be

due higher financial capital from employment income; human capital in work skills learnt that may prove useful in times of need; and social capital through potential effective networks that may provide assistance during crisis. This question is therefore relevant: are there any differences between respondents of different employment status and perceived personal levels of resilience in Boscastle and Wadebridge? Do those respondents that are employed perceive themselves to have higher personal levels of resilience compared to respondents that are unemployed, students or undertaking alternative options?

Results (Table 19 and 20 below) show this is not true as there is *no* statistically significant difference between respondents' employment status and their perceived level of personal resilience. Although data shows that respondents who are students and unemployed in both field sites have the lowest mean rank scores of all respondent employment status groups, these scores are *not significantly lower*. This may be due to the small sample size of these groups of respondents.

	My personal level of resilience is high.
Chi-Square	4.377
df	4
Asymp. Sig.	.357

Table 19: Results of the Kruskal-Wallis H-test showing showing no statistically significant difference between (i) perceived personal levels of resilience and (ii) different employment groups of respondents in Boscastle.

	My personal level of resilience is high.
Chi-Square	4.596
df	4
Asymp. Sig.	.331

Table 20: Results of the Kruskal-Wallis H-test showing showing no statistically significant difference between (i) perceived personal levels of resilience and (ii) different employment groups of respondents in Wadebridge.

3.1.11 Economic status and personal resilience levels

It may also be assumed that respondents with access to higher levels of financial capital, including assets outside of possible employment income, may perceive themselves to be more resilient compared to those with weaker financial backing. Consequently, an assessment to compare if a difference exists between respondents across different levels of economic standing and perceived personal levels of resilience was undertaken.

Results in Table 21 and 22 below show that there is *no* statistically significant difference between respondents of different economic standing and perceived personal levels of resilience. This is therefore no link between difference in individual economic status and higher or lower levels of perceived resilience.

	My personal level of resilience is high.
Chi-Square	6.955
df	4
Asymp. Sig.	.138

Table 21: Results of the Kruskal-Wallis H-test showing no statistically significant difference between (i) perceived personal levels of resilience and (ii) different economic status groups of respondents in Boscastle.

	My personal level of resilience is high.
Chi-Square	4.287
df	4
Asymp. Sig.	.369

Table 22: Results of the Kruskal-Wallis H-test showing no statistically significant difference between (i) perceived personal levels of resilience and (ii) different economic status groups of respondents in Wadebridge.

3.1.12 Length of time in community and personal resilience levels

Similarly, it may be assumed that the longer one lives in a place, the more attached they feel to it, contributing to willingness to adapt to changing circumstances and therefore build

potential resilience levels (Lewicka 2011; Amundsen 2014). In the context of this research therefore, the following question was asked: Is there a relationship between length of time respondents have resided in either Boscastle or Wadebridge and perceptions of individual resilience levels?

As stated above, the average length of time respondents have spent in their respective community's is similar: 21 years (rounded) in both Boscastle and Wadebridge. However, there is *no* significant connection between length of time respondents have lived in either community and perceived levels of personal resilience (as correlation coefficient values are low and statistically non-significant in Tables 23 and 24 below). Therefore, there is no link indicating that for respondents living in Boscastle or Wadebridge for an increased length of time that this contributes to individual perceptions of increased resilience.

			My personal level of resilience is high.	Time in community
Spearman's rho	My personal level of resilience is high.	Correlation Coefficient	1.000	.103
		Sig. (2-tailed)	.	.395
		N	70	70
	Time_in_community	Correlation Coefficient	.103	1.000
		Sig. (2-tailed)	.395	.
		N	70	70

Table 23: Results of the Spearman rho test showing no significant relationship between (i) length of time respondents have resided in Boscastle and (ii) perceptions of individual resilience levels.

			My personal level of resilience is high.	Time in community
Spearman's rho	My personal level of resilience is high.	Correlation Coefficient	1.000	-.021

Time_in_community	Sig. (2-tailed)	.	.834
	N	100	100
	Correlation	-.021	1.000
	Coefficient		
	Sig. (2-tailed)	.834	.
	N	100	100

Table 24: Results of the Spearman rho test showing no significant relationship between (i) length of time respondents have resided in Wadebridge and (ii) perceptions of individual resilience levels.

In sum, the above results show that for respondents in both Boscastle and Wadebridge, there is no significance between perceived levels of personal resilience and gender, age, employment status, economic standing, or length of time that respondents have lived in their respective community.

3.1.13 Reliability of survey used

Results of Cronbach's Alpha coefficient (Table 25 below) suggests very good internal consistency reliability for the scale used to construct CR characteristics. This means that the Likert scale items used on the survey "hang together" (Pallant 2013: 101) and support effective measurement of selected characteristics. Consequently, the overall reliability of the survey is strong.

The only CR characteristic shown not to yield as strong a result is "community networks." As emphasised below, this is likely due to the reduced number of items used on the survey to shape this dimension.

Community resilience characteristic	Cronbach's Alpha	Number of Likert scale Items on survey
Place attachment	0,850	8
Leadership	0,823	7

Community cohesion and efficacy	0,842	9
Community networks	0,645	4
Knowledge and learning	0,818	7

Table 25: Results of Cronbach's Alpha test showing the reliability of community resilience assessment scale used.

3.2 Qualitative results

Results from qualitative data collection both complements the above quantitative evidence on perceptions of CR, yet also highlights disparities within it.

3.2.1 Boscastle

3.2.1.1 Respondent scale of perceived importance

Qualitative data reinforces quantitative results above: “PA” is perceived to be the most important of all characteristics in building CR, and “leadership” the least. Figure 7 below depicts the same quantitative results presented in Table 7 above but through a qualitative lens. However, figure 7 below emphasises that respondents perceive building CR as a cyclical process. Each characteristic is required in order to support the development of the characteristic that precedes it. Moreover, qualitative insights highlight the influence of effective historical capacity to self organise around a past crisis as strengthening CR characteristic constructs.

3.2.1.2 Community resilience characteristic construction

Unpacking figure 7 with qualitative data elicited provides a deeper understanding of each CR characteristic and reasoning for its place on the scale of perceived importance. Insights into leadership are provided in figure 7, with the other characteristics presented in figures 8 and 9 below.

3.2.1.3 The local risk landscape

As different risk factors or conditions may influence CR levels, understanding respondent perceptions of general risks faced in Boscastle is important. Findings are presented in Table 26 below.

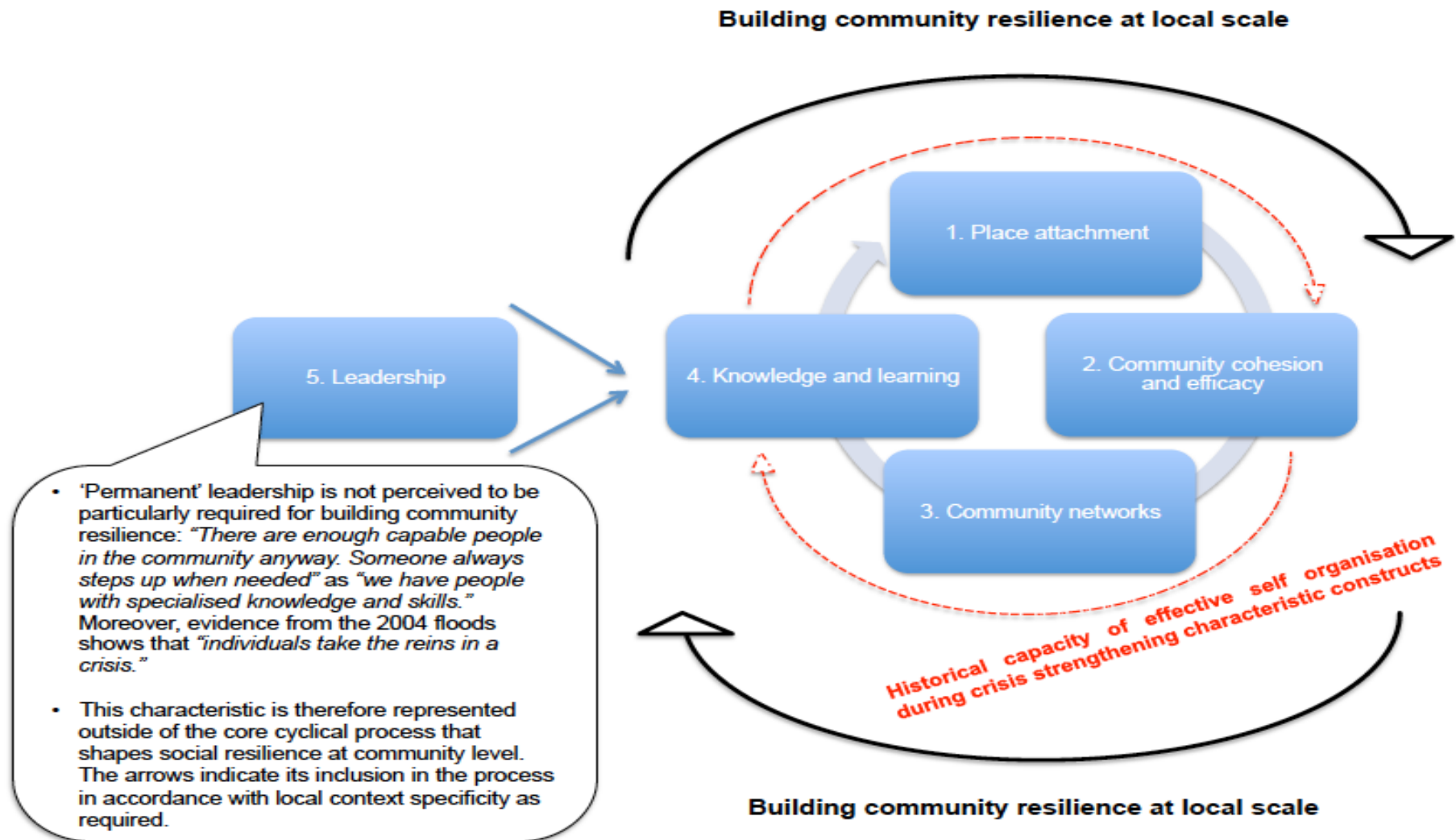
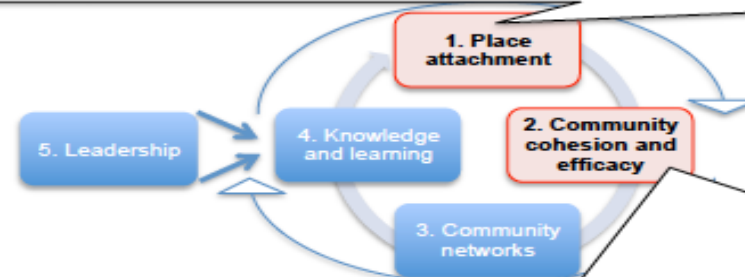


Figure 7: Prioritisation of community resilience characteristics from perception of respondents in Boscastle on a scale of 1 to 5 (number 1 represents the most important characteristic for building community resilience and number 5 represents the least important).

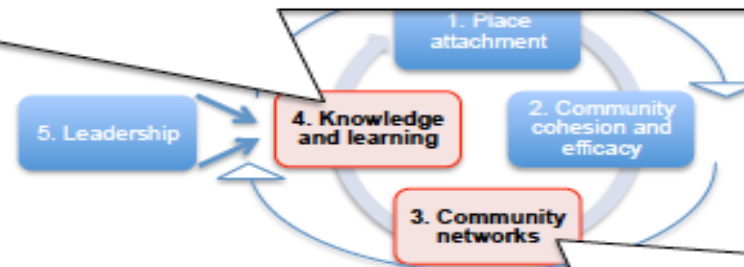
- PA is key for respondents based on perceptions of social and physical constructs:
"Like-minded people attracted to the place...strengthens community resilience."
"Caring about where you live builds resilience."
"It is about loyalty to a place; it breeds commitment to it."
- Social memory of effective local response to the 2004 flooding crisis contributes to notions of PA: *"It gave a shared focus of safety for the community...a way forward for the future that has strengthened my connection [to Boscastle]."*
- PA is perceived to be required at both individual and community level: *"There is a need for key people to instigate ideas based on attachment, and the community to support them."*
- PA contributes preparedness to live with future flood risk: *"Yes we want to live here despite the challenges. We know it will flood again, flooding is historical here, and we're prepared to still live here. We can cope, we have always coped."*



- This characteristic is important because *"it's forms the backbone of community resilience."*
- The ties and bonds made during the 2004 floods helps the community deal with current and future crisis, both short-term, long-term, and to specific and general risks. *"Community spirit was exceptional. If another crisis would happen again it would be the same. People united...it was a shared experience across all the community."* It was however highlighted that *"until crisis happens again we can't really tell."*
- Community cohesion was strengthened after the 2004 floods through regular community meetings focused on adapting to change. No such meetings are currently held. *"If something happens, the community gets together and does something as needed."*
- Perceptions of unity are mixed. Some respondents perceive *"a lack of cohesiveness and communication within the community."* Yet not so for others. *"You have to get actively involved...it's a mucking in place."* (see "community networks" below)
- Respondents perceive efficacy to exist. They feel empowered to act and have an ability to make a change. However, how effective action is depends in part on regional institutions yielding influence on community resilience levels (see "community networks" below).

Figure 8: Unpacking community resilience characteristics of “place attachment” and “community cohesion and efficacy” in Boscastle from qualitative data sources.

- Knowledge acquisition and continuity for capacity building: the knowledge learnt during the 2004 floods will continue informally as *"it will always perpetuate itself" as "people in the community constantly talk."* Yet, more formal knowledge training is also required: *"This knowledge will not continue into the future if there is not regular training."* This is seen to be delivered in part through existing schooling, training of key emergency response teams and through the local magazine.
- Community spaces to support the generation and exchange of ideas within the community exist to some degree, as does an exchange of knowledge from older to younger generations (though not visa versa).
- *"Iterative learning"* is stated to be essential for building resilience, with respondents *"open to 'new' knowledge."* However, transmitting knowledge can be challenging as residents *"often come and go."*
- Local knowledge: *"Agencies often make efforts to get local opinion and knowledge, but it seems they do not like it or they ignore it. They think they know [what is best for us]."* Also, although traditional land/flood management knowledge and practice *"is still known, not in effect lost, it simply is not applied anymore."*



- Internal community networks (bonding social capital) are perceived as important: *"Building community spirit, getting things done, support."* Having a *"variety of community members"* is also key, including those that bring the *"outside factor"* – incoming residents who use their external networks to get things done. Also, experience of the past floods in 2004 strengthened network-bases: *"It opened up the community. I know more people now due to the flood than before."*
- External networks (bridging social capital) are seen as playing a role in building community resilience, yet only up to a certain point as external agencies are not relied upon. *"Our strength is that we are individuals."* *"The after effects of the flood was in a way more of a crisis... how agencies dealt with it created almost more problems than the flood itself."* Although some respondents perceive that the existing *"weak"* relationship with certain key regional institutional agents of change *"makes us more resilient as there is strength in adversity,"* for other it does *"weaken community resilience as 'our landlords' don't communicate with us [yet own land/infrastructure in and around Boscastle]."*
- Respondents lack trust in certain key regional institutions as they *"pay lip service to us...they are not interested to meet with the community to discuss matters."* Actions are believed to be undertaken *"with no consultation and then we as the community fight actions undertaken."* A new dialogue is necessary. This needs to be based on an *"honest, transparent relationship...a fair exchange of views and corresponding action."*

Figure 9: Unpacking community resilience characteristics of “community networks” and “knowledge and learning” in Boscastle from qualitative data sources.

Locally perceived general risk factors influencing resilience levels	Illustrative quotes	Additional attributes perceived to strengthen community resilience
Community fragmentation • Divide between old and influx of “new” residents • Second home owners rent properties out, not part of the community; people do not have neighbours anymore – especially hard for the elderly • Empty holiday homes are reducing population numbers • New residents wanting to change the ethos of the village – becoming increasingly more middle class with opportunities for youth to live in Boscastle decreasing as house prices have increased substantially (access to affordable housing, especially for first time buyers) combined with lack of council housing stock	• “Second home owners who only want to make a profit and rent their property out rather than be a part of the community”	• Staying united despite community differences • Tolerance: community to be “open” to others • Community spirit • Necessity that brings people together
Ineffective institutional decision-making and action • Local services now undertaken by regional institutions rather than residents and services and are not performed effectively • Weak local Council (despite quite high number of Council members) • Lack of local voice: relationship between Parish and County Council is poor now District Council has been abolished	• “Decisions made outside of the community by people that don’t know the culture”	• Strong local Council • Effective communication between community members and agencies
Response to change • Community not change patterns to move with current societal trends; break down of historical community	• “The community struggles with change. It lets things die rather than change its patterns so it moves with current societal trends”	• Acceptance of changes/events that occur • Acknowledgement of elderly residents who possess capacity to cope with adversity/uncertainty given life experience
Identity • Divide between more recent commercialisation and keeping the historic character of Boscastle • Lack of identity of “old” village	• “Not let village become too commercial, keep it as it was, with character”	
Lack of access to community assets • Geographic isolation: access to public transport; hospital; health care difficult • Human and fiscal resources: education (need to keep schools open); closing down of Churches		• Access to needed resources / funding
Economy • Extreme pressure to attract sufficient numbers of tourists during summer months to keep local economy going • Need to start attracting tourists during winter months • Need to balance number of tourist shops with “useable” shops for residents		
Employment • Lack of all year round employment opportunities (including for youth) • Low wages and low skilled jobs available • Lack of access to alternative business opportunities		
Youth • Lack of incentives to keep youth in Boscastle (including education and job opportunities) • Loss of beneficial skills	• “Need to keep youngsters here...opportunities for younger people to live here are getting less”	
Environmental concerns • Potential threat of flooding • Reliance on inaccurate weather forecasts		

Table 26: Local perceptions on general risk factors and additional dimensions supporting community resilience in Boscastle.

3.2.2 Wadebridge

In line with the quantitative results above, a slightly different picture on CR in Wadebridge also emerged from qualitative evidence compared to Boscastle. Moreover, a slightly different interpretation of the above results was also presented within Wadebridge itself.

3.2.2.1 Respondent scale of perceived importance

Quantitative results (sections 4.1.4, 4.1.6 and 4.1.7 above) show “leadership” is perceived to be important for building CR from respondents’ perspective in Wadebridge both at individual and community scale. However, when considering its mean score value, it is indicated to hold the least significance of all CR characteristics.

In contrast, qualitative approaches show that respondents in Wadebridge prioritise leadership differently. Leadership is not considered to hold the least relevance. Additionally, it is viewed as being “transferable” in its applicability in shaping CR. This means that it can potentially form the second or third component in the resilience building process depending on the status of development of Wadebridge (see figure 10 below). Moreover, “community networks” and “knowledge and learning” are believed to be in inverse positions on the CR building cycle for respondents in Wadebridge compared to Boscastle.

3.2.2.2 Community resilience characteristic construction

Figures 11 and 12 below present the constructs of CR characteristics in further detail.

3.2.2.3 The local risk landscape

The general risks perceived by respondents in Wadebridge are presented in Table 27 below. As certain risks and all additional attributes perceived to strengthen CR are similar to those perceived in Boscastle, only the additional risks are presented.

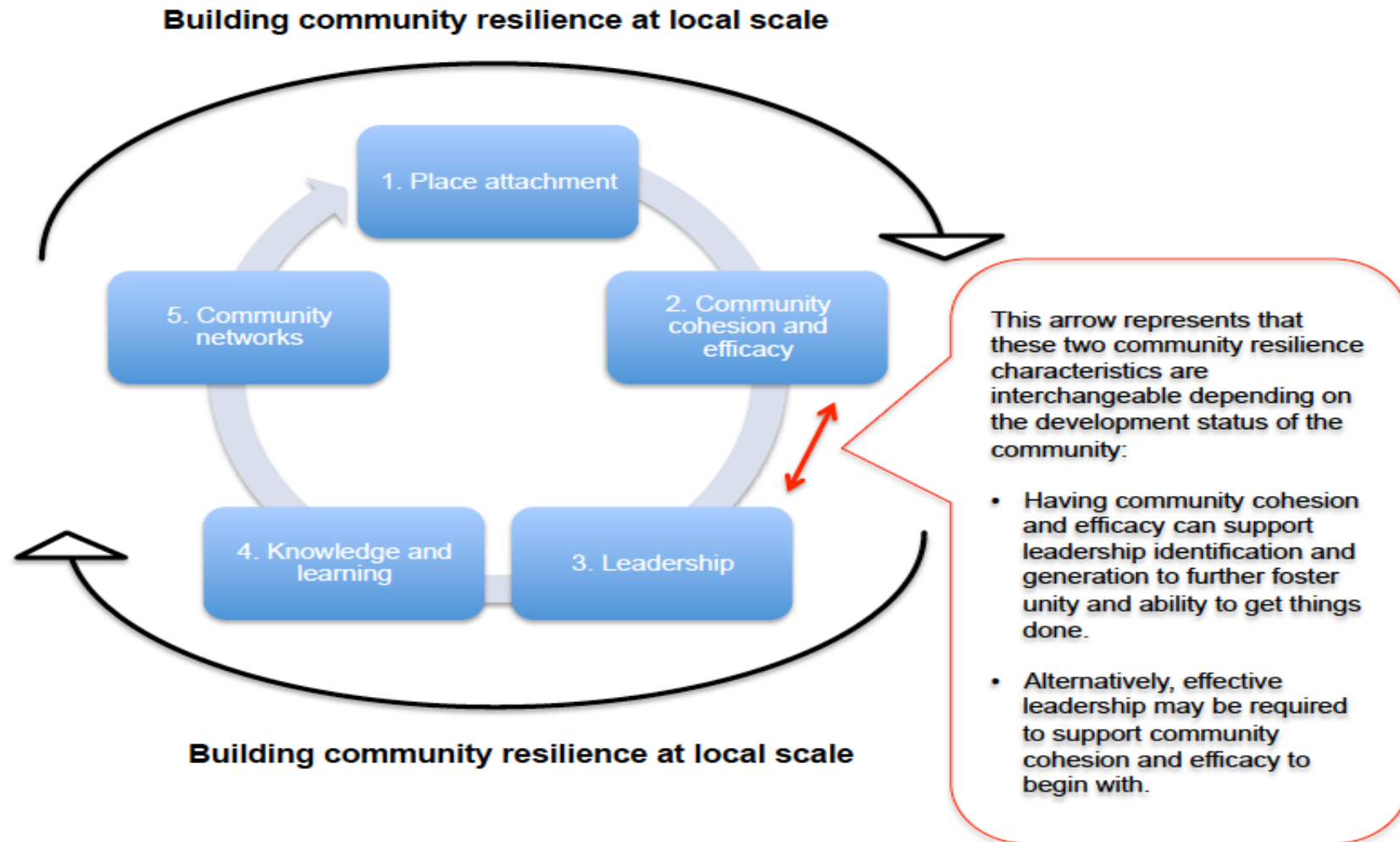


Figure 10: Prioritisation of community resilience characteristics from perception of respondents in Wadebridge on a scale of 1 to 5 (number 1 represents the most important characteristic for building community resilience, and number 5 represents the least important).

- PA is perceived to be required by key individuals and at community level. Majority of residents need to perceive PA in order to build resilience so that *"people feel they are on the same wavelength."* Yet also having core community members is needed as they will draw others in: *"The process will grow over time within the community."*
- PA is seen as a positive attribute, but only up until a certain point – this is relevant for Wadebridge in a cultural sense (not environmentally). There is a lack of action that is needed to link the town with the rest of Cornwall.
- PA influences residents' motivation to undertake action that builds CR.



- This characteristic is getting stronger in Wadebridge. It is seen to be essential for building community resilience as *"coming together is needed. Clashes occur if everyone does their own thing and follows their own agenda."*
- The community is perceived to be self-reliant: *"If a major crisis occurred there would be an incredible response."* The community would help each other with resources (eg meals, accommodation) but not financial support: *"We're spirit rich not financially."*
- Respondents perceive the community to be united, with this unity supporting building resilience in a crisis – both short and long-term, and also to specific and general risk. *"People would come together as needed."*
- Respondents perceive efficacy to exist. They feel empowered to act and have an ability to make change happen. Yet, as with Boscastle above, response is currently perceived to be constrained by lack of meaningful regional institutional engagement.

Figure 11: Unpacking community resilience characteristics of “place attachment” and “community cohesion and efficacy” in Wadebridge from qualitative data sources.

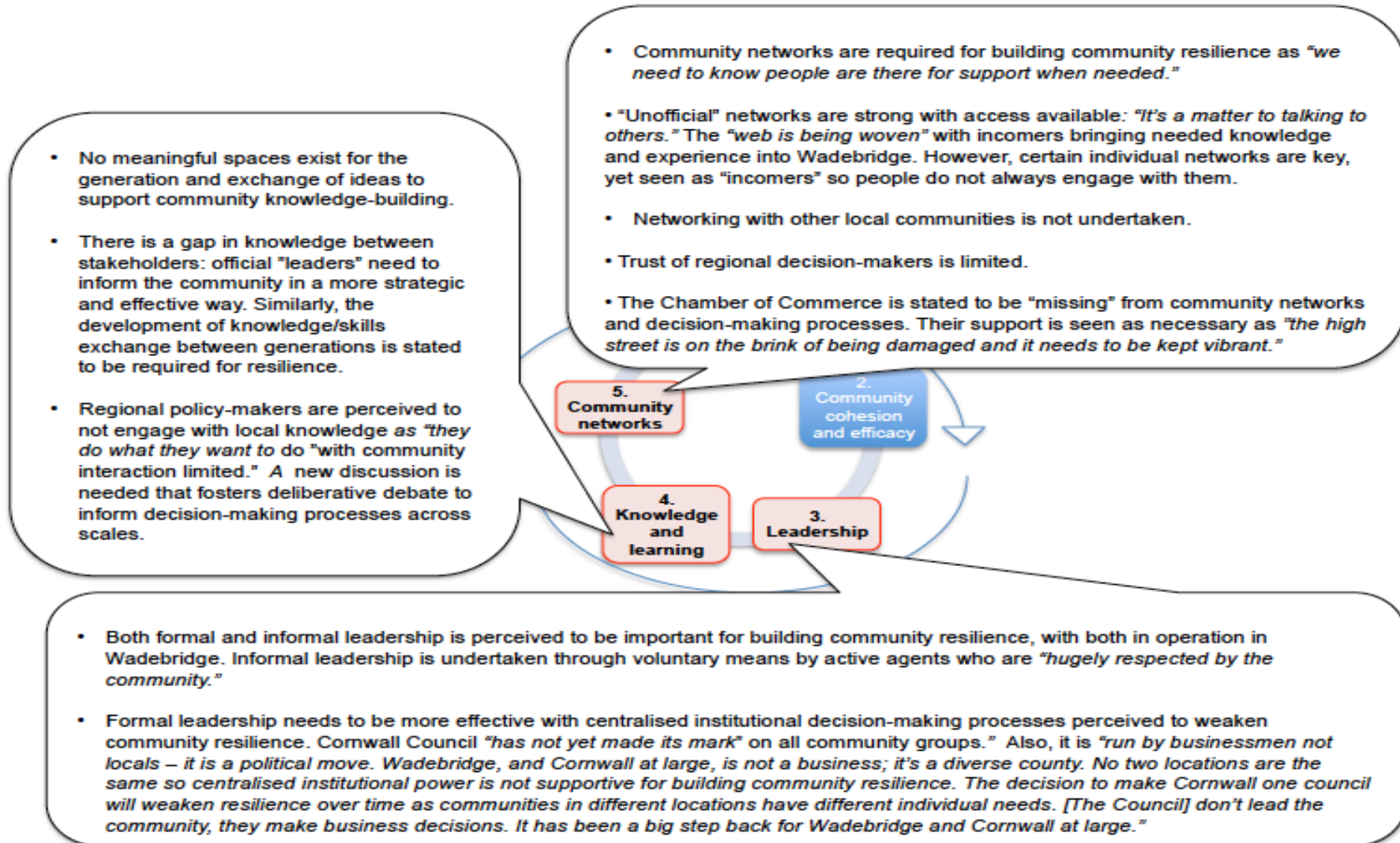


Figure 12: Unpacking community resilience characteristics of “leadership,” “knowledge and learning” and “community networks” in Wadebridge from qualitative data sources.

Locally perceived general risk factors influencing resilience levels	Illustrative quotes
Threat to commercial independence • Keeping local businesses in operation (versus chain stores)	
Power dynamics • Regional decision-makers not taking community interests into consideration • Lack of opportunity to voice local concerns – loss of local power • Lack of action based on community requests • Large gap between local decision-makers/leaders and community	• <i>“There is too much separation between people at the top and locals at the bottom”</i> • <i>“We need to come together to make a difference to the local community and be able to change.”</i> • <i>“The community is not resilient here. People with money either do things for themselves or people don’t get a say.”</i>
Differing views on future goals • Large environmental focus/power efficient town are unrealistic goals for Wadebridge	• <i>“Short-term political expediency overriding real local need”</i>
Flood risk • Potential threat of flooding along the Camel River • Higher flood defenses along required	

Table 27: Additional local perceptions on general risk factors faced by respondents in Wadebridge.

4: Analysis and Discussion

This study is testing its proposed hypothesis by asking: what is the evidence that shows how important selected characteristics are perceived to be for building CR from perceptions of respondents themselves in selected study sites? And what is an effective approach to assess their perceived importance? To answer these questions, a number of key results will be discussed below.

Evidence supports existing assumptions (Magis 2010; Ross et al. 2010; Buikstra et al. 2010; Amundsen 2014) that selected characteristics are perceived by respondents to be useful in conceptualising CR. However, as expected, degrees of perceived importance vary between characteristics and between communities under analysis as each context “is a constellation of resilience factors that come together in ways that are unique to each situation” (Twigger-Ross et al. 2014: 86). Moreover, levels of perceived resilience are raised or lowered through the constructs of the characteristics themselves, with quantitative and qualitative approaches providing different insights.

4.1 Place attachment

Both quantitative and qualitative evidence goes beyond existing research that shows PA supports resilience (Norris et al. 2008; Ross et al. 2010; Leykin et al. 2013) by indicating that it is perceived to be the most fundamental characteristic driving CR forwards compared to other characteristics assessed in this study. PA is therefore the incentive kick starting the CR process presented in figures 6 and 8 above.

Perceptions from both field sites support Amundsen (2013). PA is shown to contribute to action that supports resilience through community engagement (see sections 4.2 and 4.5 below). Likewise, qualitative evidence from Boscastle highlights PA as supporting “positive internal (self) resilience” as it is considered a positive influence despite acknowledgement of

future flood risk, highlighting preparedness to live with uncertainty (Shaw et al. 2014: 201).

However, “positive internal resilience” is also characterised by the acceptance of change, which qualitative data in Table 26 above indicates that community members in Boscastle are not necessarily perceived to possess at large outside of the past crisis event. As discussed below, evidence indicates that most “local” respondents struggle with current socio-economic contextual changes regarding the impacts of “incomers”, yet ability to “thrive in an environment characterised by change” is a core construct of CR (Magis 2010: 401).

Furthermore, it is stated that despite the historical and current resilience of a community, whether such resilience will be applicable in the context of future multi-scalar change cannot be assumed (Amundsen 2014: 53). The work of Marshall et al. (2012) is therefore relevant. PA is stated to be positive, yet only up until a certain point. Although strong PA is felt in the current context of change, the multi-scalar nature of potential future change may render this attachment more dangerous if increased risk occurs. Likewise, although the prime driver of CR, evidence shows that PA presents another potential limit in Boscastle: the attraction of place contributes to the influx of “incomers”, yet this influx is perceived to both undermine and/or support CR depending on the viewpoint of the respondent. Although the pace of influx is more rapid in Boscastle, the above points are also valid for Wadebridge in light of future proposed trends.

Still, as it is response to change that is critical in resilience assessment, evidence extends the notion presented by Devine-Wright (2013) who states that increased PA is often seen during times of threats to place. In Boscastle, effective community cohesion and response to crisis has enhanced perceptions of PA for certain respondents.

4.2 Community cohesion and efficacy

Both quantitative and qualitative evidence attributes the same level of importance to this characteristic. It also holds the same position in both CR processes (figures 6 and 8 above). However, field sites present different insights into its construct.

Following on from above, Twigger-Ross et al. (2014) states that more consideration on “working out how to translate temporary relationships established during crisis events that provide opportunities to create resilience into longer lasting aspects of resilience is required” (p62), as “resilience is to be viewed as dynamic relationships and processes rather than as a static characteristic of an individual or community that once achieved does not need to be addressed after” (p37). Correspondingly, all evidence from Boscastle shows that the relationships established during the 2004 floods are perceived to extend beyond the crisis event, and to both specific and general risk factors as context demands i.e. if another crisis event occurred then those relationships would come into effect. Qualitative results add to this: “community spirit” strongly supports perceptions of resilience sustainability to future crisis, contributing to perceived levels of individual and CR.

Moreover, community cohesion and efficacy established during the past flood event is also actively enhanced in the present context. Qualitative evidence builds on that elicited quantitatively showing that most Boscastle respondents are engaged in community meetings or clubs fostering activities from entertainment to emergency responses services. This provides a strong sense of cohesion and efficacy for those involved based on social network capacity (Cutter et al. 2003). However, respondents choosing not to engage perceive weakened cohesion and efficacy corresponding to weaker bonding community networks. This evidence supports Shaw et al. (2014) that “network capacity depends more on individual personality and willingness to integrate than on length of residence as “incomers” and “locals” both hold prominent roles in community activities” (p199). Overall, evidence indicates

“ongoing capacity to self-organise, the tendency to do so, and knowledge on effective means” (ibid) contributes towards perceptions of individual and CR. Evidence also supports Wilson (2012a) as respondents’ historical capacity to self-organise around an issue contributes to resilience-building.

However, Table 26 above presents that numerous “local” respondents perceive the role of “new” residents as a cause of community conflict. This is based on different perceptions of what is considered “good” for the village with the influx of “incomers” perceived to be changing community ethos and socio-economic context. This may therefore potentially influence levels of perceived future resilience if resilience of one group (for example youth) is affected by the behaviour of another within the community (for example wealthy retired types), resulting in loss of youth residing in Boscastle long-term (Cannon 2008: 16). Although some positive attributes are acknowledged, the impact of “outsiders” for future resilience is contentious.

Although to a lesser extent, these considerations are also acknowledged by Wadebridge respondents. Nevertheless, strength in perceived community unity and the emergent nature of self-reliance is highlighted as fundamental to the importance of both individual and CR levels.

4.3 Knowledge and learning

As above, quantitative and qualitative approaches present this characteristic as possessing the same level of importance, and holding the same position in both CR processes. However, different field sites present different aspects, giving rise to suggestions to potentially strengthen its construction.

The ability of communities to actively engage in reflexive learning processes is seen as essential for future CR due to the nature of multi-scalar change (Amundsen 2014: 53). In light of this, although evidence shows all respondents perceive appropriate knowledge-bases and learning mechanisms for resilience as important despite differentiated degrees of access between field sites, qualitative evidence from Boscastle digs deeper to indicate that relevant processes could be strengthened to ensure that the knowledge and learning developed from past crisis events is fully exploited. As “social memory” is at its most effective when implemented by the majority of a community rather than just specific individuals (Wilson 2012: 87), more structured knowledge mechanisms could potentially strengthen CR, as creating resilience is shown to be an ongoing process of learning from past events and to future risks (Twigger-Ross et al. 2014: 62). This is based on evidence showing the need for strengthened spaces for targeted knowledge sharing and learning that reaches beyond community activities mentioned above, to foster continuous learning that builds capacity to respond to changing conditions (Berkes et al. 2003). Similarly, encoding knowledge about how to tackle disturbance so that it is available to community members over generations (Keen et al. 2005; Oudenhoven et al. 2010 cited in Wilson 2012: 84) is recommended for sustaining social memory.

Findings from Wadebridge present a different lens given the difference in context. Quantitative evidence highlights that various respondents perceive access to informal and formal learning, yet qualitative approaches test assumptions around “scale” and “quality” of social learning that is associated with power relations (Allen 2003 cited in Wilson 2012: 82). It is perceived that formal leadership sources should improve community access to more meaningful knowledge sources, which in turn would potentially enhance perceived levels of resilience at individual and community scale. Moreover, what meaningful knowledge sources “means” needs to be considered. This shall be discussed under community networks below.

4.4 Leadership

Leadership has different applications for different community members hence its levels of importance vary between research sites. In Wadebridge, qualitative data takes a two-pronged approach: distrust of primarily formal leadership exists, yet this characteristic is emphasised as more important than others for CR. In contrast, quantitative evidence shows leadership to be the least significant characteristic, yet this does not suggest that it is not important for both individual and CR levels (see sections 3.1.6 and 3.1.7 above).

Unpacking this further provides insights into interpreted formal government failures that contribute to notions of distrust. Certain literature assumes that governance failures are attributed to an absence of leadership (Evans et al. in review: 14). However, evidence in this study moves beyond this concept to suggest that formal leadership failures are perceived to exist due to impacts perceived as unattractive to community members: change in government-led institutions from decentralised to centralised operations have contributed to feelings of lack of local identity resulting in perceptions of reduced meaningful support and hence lowered levels of perceived individual and CR.

Moreover, distrust is also perceived through certain informal leadership sources. Despite achieving practical results of knowledge-building, contested notions of local power exist leading to distrust within certain community groups and hence perceptions of contributing towards a lack of CR. However, this is not applicable to all informal leadership sources. The evolution of “active agents” (Magis 2010; Amundsen 2012) with strong charitable attributes have built trust within the community, which is conversely seen to strengthen resilience.

Quantitative and qualitative insights complement each other to show that Boscastle is different. The notion of “active agents” is again in operation, yet both sets of evidence reflect current environmental leadership literature where leaders are suggested to emerge in response to a

dominant “crisis” (Case et al. in review: 14). Existing community capacity and reliance on self-belief of individual agency to provide leadership during times of crisis, with examples shown during the 2004 floods, dominates the narrative. Strong ongoing formal or informal leadership is not perceived to be necessary outside of times of perceived community-scale crisis. Leadership is therefore not perceived to be a fundamental attribute for CR based on existing social community infrastructure that is perceived to satisfy required needs. Evidence from both field sites supports Case et al. (In review) that further critical analysis on leadership would benefit understanding of how it influences the negotiated and often contested outcomes of CR (p12).

4.5 Community networks

At both field sites, qualitative evidence shows that individual bonding network-bases are strong. Their success relies heavily on the provision of emotional support that enhances recovery from perceived crisis events at individual and community level. As recovery is key to resilience (Liao 2012 cited in Shaw et al. 2014: 203), this represents the importance attributed to this characteristic that results in feelings of strong robustness at individual and community scale. This mirrors quantitative results in Wadebridge, yet not in Boscastle. Here community networks are not perceived as (statistically) significant in building individual resilience levels despite the contrast shown through qualitative findings.

Following on, external bridging networks with key regional institutions are largely perceived to exist in both locations, yet are not strong and hence do not contribute to constructing the importance currently attributed to this characteristic for all respondents. For example, in Boscastle, internal community agency enabled more rapid recovery to past crisis compared to external institutional support. Findings align with Whittle et al. (2010): locally perceived ineffective agency action contributed to feelings of increased trauma compared to that experienced during the flood itself.

Building on this, evidence indicates that institutions with the capacity to influence CR do not provide the resources and processes necessary for it. Linking back to the characteristic on knowledge and learning, qualitative findings from Boscastle and Wadebridge show this includes the need for meaningful participation in CR decision-making, planning and action: communities would perceive to have stronger resilience if more deliberative policy processes (Keeley and Scoones 2003) and inclusive systems of governmentality (Foucault et al. 1991) that recognised different knowledge claims (Lukes 2005) were worked towards. KII findings from the MAGIC project show that regional institutions recognise the need for an alternate risk policy process at community level. Evidence suggests that shifting from an existing “knowledge system” to a “learning system” would be useful (Hall et al. 2012: 23; Westley et al. 2012). Moreover, this study displays the importance of selected social CR characteristics according to respondent perceptions. It is therefore recommended that these constructs are considered in discussions re-framing the meaning of community resilience itself between relevant stakeholders across scales (Chaplin et al. 2011) to strengthen community resilience in both study sites.

4.6 Additional insights

Although quantitative evidence indicates that age does not directly influence individual perceptions of perceived resilience in both field sites, qualitative evidence in Table 26 above suggests that older adult contributions to resilience should be acknowledged. This follows perceptions of strengthened coping mechanisms presented in existing research on dealing with adversity given their increased life experience (Wells 2010; Schwarz et al. 2011). For some respondents therefore, older adults offer invaluable attributes that strengthen CR.

Furthermore, section 3.1.4 above presents that residents in Boscastle perceive themselves to be more resilient to general risks overall compared to residents in Wadebridge, and more resilient in each specific CR characteristic. Qualitative evidence from Boscastle provides further insights into this outcome: past experience of a crisis event is perceived to be

significant (see figure 7 above coupled with the above evidence that in part is shown through a lens of how the past flood event served as a baseline against which perceptions were voiced). It is possible to suggest that respondent insights in part reflect the “innoculation effect” (Eyesenck 1983; Norris and Murrell 1988). Individuals may perceive themselves to be more resilient to a particular stressor or crisis event, based on their psychological ability to cope better with it based on previous life experience of it. Past experience of a crisis in Boscastle may provide respondents with a certain level of perceived “built-in resilience” (Jabeen et al. 2010) due to “tried and tested” community cohesion, efficacy, internal networks (including informal leadership), and knowledge and learning of a previously successful community response to major change. However, the possibility of any community seeming robust when viewed in isolation needs to be acknowledged (Anderies and Jansson 2011 cited in Amundsen 2014: 53) given the trajectory of potential unprecedented change and its multi-scalar nature where local contexts are increasingly influenced by global processes that are unlikely to be resolved locally (Cannon 2008: 15).

4.7 Methodological reflections

As discussed above, quantitative and qualitative approaches used in this study provide different lenses on CR. As a complex construct, how to measure both the dynamic “processes” that shape the importance of selected CR characteristics, as well as the “outcomes” of their importance is not straight-forward given the different degrees of complexity involved including the delivery of different learning benefits (Castleden et al. 2011). Moreover, there is not one generalised way to measure CR that is necessarily appropriate across contexts or actors (Frankenberger and Nelson 2013: 2). Nevertheless, as discussed in section 1.1, insights are required to support relevant agencies understand the factors and processes that influence resilience at individual and community level (ibid). So what insights are gained from employing the different research methods used?

As sections 2.2 and 3.1 show above, quantitative assessment was based on a series of proxies that developed a baseline subjective community resiliency profile for each field site. This approach is stated to serve as a useful reference point given its ability in this study to assess the perceived importance of characteristics that potentially influence a community's capacity to respond to change (Leykin et al. 2013). Likewise, resulting “resiliency scores” can potentially provide a reference point for future comparison to investigate variations between different characteristic measurements given the non-static nature of resilience (Cohen et al. 2013: 1738). Moreover, this approach supports indicator development to measure conditions influencing CR to explain why communities may experience change differently (Cutter et al. 2013). Yet, to what degree relevant complexities can be captured is questionable with many challenges presented.

To what extent the richness of individual attributes that construct characteristics is potentially “lost” through the development of resiliency scores that represents a single resilience measurement is contentious (Frankenberger and Nelson 2013: 34). Is emphasis given to the overall composite index score more interesting than how the scores are comprised? Likewise, to what extent are single resilience scores useful? Do they possess “meaning” if they are only compared against other construct measurements and over time? Furthermore, as it is widely agreed that there is no end desired state to be worked towards (Brown 2013), what long-term significance do resiliency scores possess at large? As CR is non-linear, increases in resiliency score “value” may not necessarily equal (permanent) improvements in resilience, with challenges of measuring direct attribution of note.

Similarly, this approach assumes that selected CR characteristics can be quantified to begin with. Equally, ensuring that complexity is not reduced in order to aid evaluation of it through “neat, bounded, controlled” assessment insights needs to be recognised (Patton 2011). Moreover, in addition to the challenges raised in section 2.4 above, it is often assumed that dimensions derived from statistical analysis represent real-world dimensions, rather than only

“real” in a statistical sense (Field 2013: 671). This therefore brings attention to robustness, with the production of “reality” to be acknowledged (Law 2004).

Nevertheless, it is indicated that this approach supports making data useful by translating it into a format and language that can be understood by key agents of change so that it can aid relevant decision-making processes (Cohen et al. 2013). However, considerations highlighted in section 4.5 above are relevant here: meaningful participation in decision-making processes is necessary. This indicates that the concept of CR is required to be operationalised in different ways to be useful. There is therefore demand for qualitative approaches to complement those that are quantitative to provide a more integrated and rigorous approach to CR assessment (as utilised in this study) (Bene et al. 2012).

Although qualitative evidence provides a more in depth lens to CR constructs, it does have limitations. As Kulig et al. (2008) articulate, qualitative findings are not always generalisable. Similarly, FGD dynamics can “restrain how unique respondent perceptions can be while also leading to “group-think” on certain topics” (p91) hence raising questions of validity. Likewise, the appropriate translation of qualitative data into useful conclusions and into a format well received for decision-making proposes challenges.

5: Conclusions

This study presents quantitative and qualitative evidence highlighting the importance of five selected characteristics in building CR to multi-scalar risks from the perspective of two communities living in North Cornwall: PA; leadership; community cohesion and efficacy; community networks; and knowledge and learning. The current changing socio-economic and climatic Cornish context supported the relevance for testing existing assumptions in contemporary literature-bases on the significance of the above CR characteristics for residents in Boscastle and Wadebridge. Communities in these locations face diverse sets of risk factors and differentiated experiences of past crisis events that are set against a background characterised by the most damage incurred to community assets in any county in the UK over the 2013/14 winter storms raising regional institutional awareness of the need for improved dialogue on CR processes at local scale. Moreover, given the distinct knowledge gaps on the effective assessment of - what contributes towards and how to measure – CR at local level, this study also evaluates how useful the assessment approaches used are in generating learning considered useful for supporting more meaningful dialogue and decision-making on CR.

Quantitative and qualitative findings from a one-time measurement during a non-crisis event complement each other yet also highlight disparities. At large, respondents perceive selected characteristics to be useful in conceptualising what shapes CR. Both approaches show “PA” as the key driver of CR based on notions of supporting community engagement and preparedness to live with uncertainty. However potential limits are posed: the attraction of place contributes to the influx of “incomers”, yet this influx is also perceived in part to undermine CR in both locations. Similarly, both methods show “leadership” to hold the least relevance for CR for Boscastle respondents based on internal self-reliance on leadership emergence during times of need. Correspondingly, although quantitative findings on leadership in Wadebridge show the same result albeit for different reasons, qualitative

approaches highlight it holds more importance than other characteristics despite stated distrust of formal leadership sources.

Other results show “community cohesion and efficacy” is perceived as the second most important characteristic for CR for all respondents. This is followed by “community networks” and “knowledge and learning” for Boscastle respondents. In Wadebridge these latter two characteristics are reversed in order of perceived importance. Evidence supporting these claims includes significance attributed to robust internal social networks and strong recovery based on emotional support. However, more structured mechanisms for improved social learning is suggested for both communities with the need for more deliberative decision-making with external institutions that influence CR stated. Moreover, qualitative data emphasises how respondents perceive building CR as a cyclical process. Each characteristic is required in order to support the development of the characteristic that precedes it. Also, gender, age or employment status is shown to bear no significance on perceived resilience levels.

Furthermore, quantitative results show that respondents in Boscastle perceive themselves to be more resilient to general risks overall, and more resilient in each CR characteristic compared to Wadebridge respondents. Possible reasons from qualitative sources emphasis effective historical capacity to self organise around a past crisis event including potential hints of the “inoculation effect”: enhanced individual psychological ability to cope better with a particular risk based on successful local responses to previous life experience of it.

Looking at the effectiveness of assessment methods used in this study, numerous challenges in capturing CR characteristic complexities are highlighted. Quantitative tools based on a Likert scale survey approach and statistical analysis largely generate “resiliency scores” that provide a reference point on perceived importance of relevant characteristics and variations between different characteristic measurements. Contributions to indicator development for CR

is also provided. Yet, how accessible findings are for decision-makers is debatable. Amongst others, this approach assumes that selected CR characteristics can be quantified to begin with. Similarly, to what extent the richness of characteristic construction is “lost” through composite index score development needs to be acknowledged. Similarly, do single resilience scores only possess “meaning” if they are only compared against other construct measurements and over time? However, as it is widely agreed that there is no end desired state to be worked towards with CR, what long-term significance do scores yield? Increases in resiliency score “value” are unlikely to equate to (permanent) improvements in resilience given its non-linear make-up, with challenges of measuring direct attribution of note.

Qualitative approaches indicate that the concept of CR is required to be operationalised in different ways to be useful. Consequently, qualitative methods are seen to complement those quantitative to provide a more integrated and rigorous approach to CR assessment. However, although qualitative evidence provides a more in depth lens to CR constructs, it also has limitations including issues of generalisability; validity when FGD dynamics restrain unique respondent perceptions; and appropriate translation of data into useful conclusions and format for agency use.

References

- Adger, W.N., Hughes, T.P., Folke, C., Carpenter, S.R. and Rockstrom, J. (2005) "Social-ecological resilience to coastal disasters." *Science* 309: 1036-1039.
- Adger, W.N., Brown, K., Nelson, D. R., Berkes, F., Eakin, H., Folke, C., Galvin, K., Gunderson, L., Goulden, M., O'Brien, K., Ruitenbeek, J. and Tompkins, E. L. (2011a) "Resilience implications of policy responses to climate change." *Wiley Interdisciplinary Reviews: Climate Change* 2.5: 757-766.
- Adger, W. N., Barnett, J., Chapin, F.S. III., Ellemor, H. (2011b) "This must be the place: underrepresentation of identity and meaning in climate change decision-making." *Global Environmental Politics* 11: 1–25.
- Adger, W. N., Barnett, J., Brown, K., Marshall, N. and O'Brien, K. (2013) "Cultural dimensions of climate change impacts and adaptation." *Nature* 3 (2): 112-117.
- Amundsen, H. (2012) "Illusions of resilience? An analysis of community responses to change in Northern Norway." *Ecology and Society* 17 (4): 46.
- Amundsen, H. (2013) "Place attachment as a driver of adaptation in coastal communities in Northern Norway." *Local Environment: The International Journal of Justice and Sustainability*. doi:10.1080/13549839.2013.838751.
- Amundsen, H. (2014) *Adapting to change – Community resilience in Northern Norwegian Municipalities*. Unpublished PhD thesis, University of Oslo. October 2013.
- Anderson, A. (2011). Assessing the effectiveness of climate adaptation. IIED Sustainable Development Opinion Paper, October 2011.
- Arora-Jonsson, S. (2011) "Virtue and vulnerability: Discourses on women, gender and climate change." *Global Environmental Change* 21 (2): 744–751.
- Bahadur, A.V., Ibrahim, M. and Tanner, T. (2010) *The resilience renaissance? Unpacking of resilience for tackling climate change and disasters*. Strengthening Climate Resilience Discussion Paper 1, IDS, Sussex.
- Bauer, M., Gaskell, G. and Allum, N. C. (2000) "Quality, quantity and knowledge interests." In Bauer, M., and Gaskell, G. (eds). *Qualitative Researching with Text, Image and Sound: A Practical Handbook*. London: Sage: 3-18.
- BBC. (2004) Where is the next Boscastle? Thursday 7 October 2004 [Online]. At: <http://news.bbc.co.uk/1/hi/uk/3719754.stm> (Accessed 4 August 2014).
- Bene, C., Wood, R.G., Newsham, A., and M. Davies. (2012) "Resilience: New Utopia or New Tyranny? Reflection about the potentials and limits of the concept of resilience in relation to vulnerability reduction programmes." *IDS Working Paper*. Vol. 2012 No. 405. Centre for Social Protection Working Paper No. 006. Institute of Development Studies (IDS) and Centre for Social Protection (CSP). September 2012.

- Berkes, F. and Ross, H. (2013): "Community Resilience: Toward an Integrated Approach." *Society & Natural Resources: An International Journal* (26) 1: 5-20.
- Berkhout, F. (2010) "Reconstructing boundaries and reason in the climate debate." *Global Environmental Change* 20: 565–569.
- Bernard. H. R. (2011) *Research methods in Anthropology: Qualitative and quantitative approaches*. Fifth edition. Lanham, Md: AltaMira Press.
- Beymer-Farris B.A., Bassett, T.J., and Bryceson, I. (2012) "Promises and pitfalls of adaptive management in resilience thinking: The lens of political ecology." In: Plieninger T and Bieling C (eds) *Resilience in the Cultural Landscape*. Cambridge: Cambridge University Press, 283-299.
- Bourdieu, P. (1987) "What makes a social class? On the theoretical and practical existence of groups." *Berkley Journal of Sociology* 32: 1-18.
- Brown, K. (2013) "Global environmental change I: A social turn for resilience?" *Progress in Human Geography*. doi:10.1177/0309132513498837.
- Brown, K. (2012) Policy discourses of resilience. In: Pelling M, Manuel-Navarrete D, and Redclift M (eds) *Climate Change and the Crisis of Capitalism*. Abingdon: Routledge, 37–50.
- Brown, K., and E. Westaway (2011) "Agency, capacity, and resilience to environmental change: lessons from human development, well-being, and disasters." *Annual Review of Environment and Resources* 36: 321–342.
- Buikstra, E., Ross, H. and King, C. A. et al. (2010) "The components of resilience: Perceptions of an Australian rural community." *Journal of Community Psychology* 38: 975–991.
- Campbell-Sills, L., and Stein, M. B. (2007) "Psychometric analysis and refinement of the Connor-davidson Resilience Scale (CD-RISC): Validation of a 10-item measure of resilience." *Journal of Traumatic Stress* 20: 1019–1028.
- Cannon, T. (2008) *Reducing People's Vulnerability to Natural Hazards Communities and Resilience*. Research Paper No. 2008/34. United Nations University (UNU)-WIDER.
- Cannon, T and Muller-Mahn, D. (2010) "Vulnerability, resilience and development discourses in context of climate change." *Natural Hazards* 55 (3): 621–635.
- Carpenter, S., Walker, B., Anderies, J.M. and Abel, N. (2001) "From metaphor to measurement: resilience of what to what?" *Ecosystems* 4: 765-81.
- Case, P. (2013) Review essay: Grint, K. *The Arts of Leadership & Leadership. Leadership and the Humanities* 1 (1): 59-62.
- Case, P., Evans, L.S., Fabinyi, M., Cohen, P.J., Hicks, C.C., Prideaux, M., Mills, D. (In review) "Rethinking environmental leadership: the social construction of leaders and leadership in discourses of ecological crisis, development and conservation." *Leadership*.
- Castleden, M., McKee, M., Murray, V., Leonardi, G. (2011) "Resilience thinking in health protection." *Journal of Public Health* 33 (3): 369–377.

Cornwall Community Flood Forum (CCFF). (2013) *DEFRA Flood Resilience Community Pathfinder* report. UK: DEFRA.

Chambers, R. (1970) *Whose reality counts? Putting the first last*. London: Intermediate Technology Publications.

Chapin, F. S. III, Kofinas, G. P. and Folke, C. eds. (2009) "Principles of ecosystem stewardship: Resilience-based resource management in a changing world." New York, NY: Springer-Verlag.

Cilliers, P., 2001. "Boundaries, Hierarchies and Networks in Complex Systems." *International Journal of Innovation Management* 5 (2): 135–147.

Cilliers, P. (2000) 'Rules and Complex Systems'. *Emergence* 2 (3): 40-50.

Clark, W. C. (2007) "Sustainability Science: A room of its own". *PNAS* 104 (6): 1737–1738.

Clark, W. C. (2010) "Sustainable development and sustainability science." In *Toward a Science of Sustainability*, eds. Levin, Simon A. and William C. Clark. Report for Toward a Science of Sustainability Conference. Airlie Center, Warrenton, Virginia, November 29, 2009 – December 2, 2009: 55-65. Princeton, NJ: Center for Biocomplexity, Environmental Institute, Princeton University and Cambridge, MA: Sustainability Science Program, Center for International Development, Harvard University.

Cohen, O., Leykin, D., Lahad, M., Goldberg, A., and Aharonson-Daniel, L. (2013). "The conjoint community resiliency assessment measure as a baseline for profiling and predicting community resilience for emergencies." *Technological Forecasting & Social Change* 80: 1732–1741.

Coleman, J.S. (1988) "Social capital in the creation of human capital." *American Journal of Sociology* 94: S95-S121.

Cote, M and Nightingale, A.J. (2012) "Resilience thinking meets social theory: Situating social change in social ecological systems." *Progress in Human Geography* 36 (4): 475–489.

Coulthard, S. (2011) "Can we be both resilient and well and what choices do people have? Incorporating agency into the resilience debate from a fisheries debate." *Ecology and Society* 17 (1): 4.

Cox, R. S. and Perry, K.M.E. (2011) "Like a fish out of water: reconsidering disaster recovery and the role of place and social capital in community disaster resilience." *American Journal of Community Psychology* 1–17.

Cumming, G.S., Barnes, G., Perz, S., Schmink, M., Sieving, K.E., Southworth, J., Binford, M., Holt, R.D., Stickler, C. and Van Holt, T. (2005) "An explanatory framework for the empirical measurement of resilience." *Ecosystems* 8: 975-987.

Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., et al. (2008) "A place-based model for understanding community resilience to natural disasters." *Global Environmental Change* 18: 598–606.

Billig, M. (2006) "Is my home my castle? Place attachment, risk perception, and religious

Davidson, D. J. (2013) "We still have a long way to go, and a short time to get there: A response to Fikret Berkes and Helen Ross." *Society & Natural Resources. An International Journal* 26: 21–24.

Davidson, D. J. (2010) "The applicability of the concept of resilience to social systems: Some sources of optimism and nagging doubts." *Society & Natural Resources. An International Journal* 23: 1135–1149.

Department for Environment, Food and Rural Affairs (DEFRA). (2010) The Flood and Water Management Act. London: DEFRA.

Dessai, S. and Hulme, M. (2007) "Assessing the robustness of adaptation decisions to climate change uncertainties: a case study on water resources management in the east of England." *Global Environmental Change* 17: 59–72.

Devine-Wright, P. (2013) "Think global, act local? The relevance of place attachments and place identities in a climate changed world." *Global Environmental Change* 23 (1): 61-69.

Devine-Wright, P. and Clayton, S. (2010) "Introduction to the special issue: Place, identity and environmental behaviour." *Journal of Environmental Psychology* 30: 267–270.

Devine-Wright, P. and Howes, Y. (2010) "Disruption to place attachment and the protection of restorative environments: A wind energy study." *Journal of Environmental Psychology* 30: 271-280.

Eysenck H. J. (1983) "Stress, disease, and personality: the "inoculation effect". In *Stress Research: Issues for the Eighties* ed. C L Cooper. Sussex: John Wiley.

Evans, L.J., Hicks, C.C., Cohen, P.J., Case, P., Prideaux, M., Mills' D.J. (In review) "Understanding Leadership in Environmental Sciences." *Ecology and Society*.

Field, A. (2013) *Discovering statistics using IBM SPSS statistics*. Fourth edition. London: SAGE.

Folke, C., S.R. Carpenter, B.H. Walker, M. Scheffer, F.S. Chapin III, and J. Rockstrom. (2010) "Resilience thinking: integrating resilience, adaptability and transformability." *Ecology and Society* 15: 20.

Folke C. (2006) "Resilience: The emergence of a perspective for social-ecological systems analyses." *Global Environmental Change* 16: 253–267.

Forbes, B. B., Stammer, F., Kumpula, T., Meschtyb, N., Pajunen, A. and Karrlejarvi, E. (2009) "High resilience in the Yamal-Nenets social-ecological system, West Siberian Arctic, Russia." *Proceedings of the National Academy of Sciences of the USA* 106: 22041-22048.

Foucault, M., Burchell, G., Gordon, C. and Miller, P. (1991) *The Foucault effect: Studies in governmentality*. Chicago: University of Chicago Press.

Frankenberger, T. and Nelson, S. (2013) *Background Paper for the Expert Consultation on Resilience Measurement for Food Security*. Supported by FAO and WFP, Rome, February 2013. Prepared by TANGO International.

Fresque-Baxter, J. A. and Armitage, D. (2012) "Place identity and climate change adaptation:

a synthesis and framework for understanding WIREs Climate Change 3: 251–266.

Fried, M. (2000) "Continuities and discontinuities of place." *Journal of Environmental Psychology* 20: 193-205.

Graham, S. (2013) "The values at risk from sea-level rise." *Environmental Impact Assessment Review* 41: 45–52.

Grint, K. (2005) *Leadership: limits and possibilities*. New York: Palgrave Macmillan.

Gunderson, L. H., and Holling, C. S. eds. (2002) "Panarchy. Understanding transformations in human and natural systems." Washington, DC: Island Press.

Hall, D., Silka, L., Lindenfeld, L. (2012) "Advancing Science and Improving Quality of Place: Linking Knowledge with Action in Maine's Sustainability Solutions Initiative." *Maine Policy Review* 21 (1): 22 -29.

Haines, A., Kovats, R.S., Campbell-Lendrum, D., Corvalan, C. (2006) "Climate change and human health: Impacts, vulnerability and public health." *Public Health* 120 (7): 585-596.

Hart, D. D. and Bell, K. P. (2013) "Sustainability science: A call for collaborative action". *Agricultural and Resource Economics Review* 42 (1): 75-89.

Hatt, K. (2013) "Social attractors: A proposal to enhance 'resilience thinking' about the social." *Society and Natural Resources* 26 (1): 30–43.

Hegney, D., Ross, H., Baker, P., Rogers-Clark, C., King, C., Buikstra, E., Watson-Luke, A., McLachlan, K. and Stallard, L. (2008) *Identification of personal and community resilience that enhance psychological wellness: A Stanthorpe study*. Toowoomba, Australia: Centre for Rural and Remote Area Health, The University of Queensland and University of Southern Queensland.

Heinz-Center. (2002) *Human Links to Coastal Disasters*. The H. John Heinz III Centre for Science, Economics and Environment, Washington, D.C.

Holling, C. S. (1973) "Resilience and stability of ecological systems." *Annual Review of Ecology, Evolution and Systematics* 4: 1–23.

Jabeen, H., Johnson, C and Allen, A. (2010) "Built-in Resilience: Learning from Grassroots Coping Strategies for Climate Variability." *Environment and Urbanization* 22 (2): 415-431.

Jackson, T., (2009) *Prosperity Without Growth: Economics for a Finite Planet*. Earthscan, London.

Jennings, T. L. (2009) "Exploring the invisibility of local knowledge in decision-making: The Boscastle Harbour flood disaster" book chapter. In *Adapting to Climate Change: Thresholds, Values, Governance*, eds. W. Neil Adger, Irene Lorenzoni and Karen L.O'Brien. UK: Cambridge University Press.

Kates, R.W. et al. (2001) "Sustainability science." *Science* 292: 641-642.

Kelle, U. (2000) "Computer-assisted analysis: Coding and indexing." In Bauer, M., and Gaskell, G. (eds). *Qualitative Researching with Text, Image and Sound: A Practical*

Handbook. London: Sage: 282–298.

Kirchhoff T, Brand FS, Hoheisel D, et al. (2010) “The onesidedness and cultural bias of the Resilience Approach.” *GAIA* 19 (1): 25–32.

Klein, J. T. (2004) “Prospects for transdisciplinarity”. *Futures* 36 (4): 515-526.

Kulig, J.C., Edge, D.S., Joyce, B. (2008) “Understanding community resiliency in rural communities through multimethod research.” *Journal of Rural and Community Development* 3 (3): 77-94.

Kulig, J., and Hanson, L. (1996) *Discussion and expansion of the concept of resiliency: Summary of a think tank*. University of Lethbridge: Regional Centre for Health Promotion and Community Studies.

Lamhauge, N., Lanzi, E and Agrawala, S. (2011) *Monitoring and Evaluation for Adaptation: Lessons from Development Co-operation Agencies*. Draft paper prepared for the OECD Joint DAC-EPOC Task Team on Climate Change and Development Co-operation meeting in Bern on 20-21 June 2011. Organisation for Economic Co-operation and Development (OECD).

Law, J. (2004) *After Method: Mess in social science research*. UK/New York: Routledge.

Leach, M. (2008) “Reframing resilience: A symposium report.” STEPS Working Paper 13. Brighton: STEPS Centre.

Lewicka, M. (2008) "Place attachment, place identity, and place memory: Restoring the forgotten city past." *Journal of Environmental Psychology* 28 (3): 209-231.

Lewicka, M. (2011) "Place attachment: How far have we come in the last 40 years?" *Journal of Environmental Psychology* 31(3): 207-230.

Leykin, D., Lahad, M., Cohen, O., Goldberg, A. and Aharonson-Daniel, L. (2013) “Cojoint Community Resiliency Assessment Measure-28/10 Items (CCRAM28 and CCRAM10): A Self-report Tool for Assessing Community Resilience.” *American Journal of Community Psychology* 52: 313-323.

Lin, N. (1999) “Building a network theory of social capital.” *Connections* 22 (1): 28-51.

Loades, K. (2013) *Is there scope for resilience measures to reduce flood risk in the Cornish communities of Flushing and Mevagissey? An evaluation of public perception and existing barriers to flood preparedness amongst those at risk*. Unpublished MSc dissertation, MSc Climate Change and Risk Management, University of Exeter.

Longstaff, P. and Yang, S.U. (2008) “Communication management and trust: their role in building resilience to “surprises” such as natural disasters, pandemic flu, and terrorism.” *Ecology and Society* 13 (1): 3.

Lopez-Marrero, T. and Tschakert, P. (2011) “From theory to practice: building more resilient communities in flood-prone areas.” *Environment and Urbanization* 23: 229-249.

Lukes, S. (2005) *Power: A radical view*. Second edition. UK: Palgrave Macmillian.

Maclean, K., Cuthill, M. and Ross, H. (2014) “Six attributes of social resilience.” *Journal of*

Environmental Planning and Management 57 (1): 144-156.

Magis, K. (2010) "Community resilience: an indicator of social sustainability." *Society & Natural Resources. An International Journal* 23 (5).

Marshall, N. A., et al. (2012). "Transformational capacity and the influence of place and identity." *Environmental Research Letters* 7 (3): 034022.

Marshall, N. A., Gordon, I. J. and Ash, A. J. (2011) "The reluctance of resource-users to adopt seasonal climate forecasts that can enhance their resilience to climate variability." *Climate Change* 107: 511–29.

Marshall, N.A, Stokes, C.J., Webb, N.P., Marshall, P.A., Lankester, A.J. (2014) "Social vulnerability to climate change in primary producers:A typology approach." *Agriculture, Ecosystems and Environment* 186: 86-93.

Marshall, N. A. (2007) "Can policy perception influence social resilience to policy change?" *Fisheries Research* 86: 216–27.

Met Office. (2004) Floods devastate village. Case study: Boscastle [Online] At: <http://www.metoffice.gov.uk/education/teens/case-studies/boscastle> (Accessed 4 August 2014).

Miles. M. B. and Huberman, A. M. (1994) *Qualitative data analysis: An expanded sourcebook*. Second edition. Thousand Oaks, California; London: Sage.

Morcrette, A. (2009) "Critical About Community: Avoiding "Stylised Facts" in Disaster Vulnerability Analysis." Unpublished MSc Development Studies dissertation. August 2009. London School of Economics.

Neal, S. (2009) *Rural identities: ethnicity and community in the contemporary English countryside*. Ashgate: Aldershot.

Nelson, D. R. (2011) "Adaptation and resilience: responding to a changing climate." *Wiley Interdisciplinary Reviews: Climate Change* 2:113–120.

Nelson, D. R., Adger, W. N. and Brown, K. (2007) "Adaptation to Environmental Change: Contributions of a Resilience Framework." *Annual Review of Environment and Resources* 32: 395-419.

Nelson, D. R., Kokic, P., Crimp, S., Meinke, H. and Howden, S. M. (2010) "The vulnerability of Australian rural communities to climate variability and change: part I—conceptualising and measuring vulnerability." *Environmental Science & Policy* 13: 8–17.

Norris, F. H. and Murrell, S. A. (1988) "Prior experience as a moderator of disaster impact on anxiety symptoms in older adults." *American Journal of Community Psychology* 16.5: 665-683.

Norris F. H., Stevens, S. P., Pfefferbaum, B., Wyche, K. F. and Pfefferbaum, R. L. (2008) "Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness." *American Journal of Community Psychology* 41: 127–150.

NRC. (1999) Our common journey: a transition toward sustainability. National Academies Press, Washington.

O'Brien, G. and O'Keefe, P. (2010) "Resilient responses to climate change and variability: a challenge for public policy." *International Journal of Public Policy* 6: 369-385.

O'Brien, K. L., Wolf, J. (2010) "A values-based approach to vulnerability and adaptation to climate change." *WIREs Climate Change* 1: 232–242.

OECD (Organisation for Economic Cooperation and Development). (2009) *Integrating climate change adaptation into development co-operation: policy guidance*. Paris: OECD Publishing.

Oxford Consultants for Social Inclusion (OCSI). (2009a) *Rural deprivation in Cornwall and the Isles of Scilly: Profile report for Boscastle*. Final report, October 2009. Brighton: OCSI.

Oxford Consultants for Social Inclusion (OCSI). (2009b) *Rural deprivation in Cornwall and the Isles of Scilly: Profile report for Wadebridge*. Final report, October 2009. Brighton: OCSI.

Olsson, P., Folke, C. and Berkes, F. (2004) "Adaptive comanagement for building resilience in social-ecological systems." *Environmental Management* 34: 75–90.

Ostrom, E. (2007). "A diagnostic approach for going beyond panaceas." *Proceedings of the National Academy of Sciences* 104 (39): 15181-15187.

Ostrom, E. (2010) "Polycentric systems for coping with collective action and global environmental change." *Global Environmental Change* 20: 550–557.

Patton, M. (2011) *Developmental Evaluation: Applying Complexity Concepts to Enhance Innovation and Use*. New York: The Guilford Press.

Pfefferbaum, R. L., Pfefferbaum, B. and Van Horn, R. L. (2011) *Communities Advancing Resilience Toolkit (CART): The CART Integrated System*. Oklahoma City, OK: Terrorism and Disaster Center at the University of Oklahoma Health Sciences Center.

Piselli, F. (2007) "Communities, places and social networks." *American Behavioral Scientist* 50 (7): 867-878.

Pitt, M. (2008) *The Pitt Review: Lessons learnt from the 2007 Floods*.

Poortinga, W. (2011) "Community resilience and health: the role of bonding, bridging and linking aspects of social capital." *Health Place* 18 (2): 286–295.

Putnam, R.D. (1995) "Bowling alone: America's declining social capital." *Journal of Democracy*, January, 65-78.

Raworth, K. (2012) *A safe and just space for humanity: can we live within the doughnut?* UK: Oxfam International.

Resilience Alliance. (2009) *Assessing resilience in social-ecological systems: a work-book for scientists*.

Richardson, K. and Cilliers, P. (2001) "What is Complexity Science? A View from Different Directions," Special Issue of *Emergence* - Editorial, 3 (1): 5-22.

Rockström, J., W. Steffen, K. Noone, Å. Persson, F. S. Chapin, III, E. Lambin, T. M. Lenton, M. Scheffer, C. Folke, H. Schellnhuber, B. Nykvist, C. A. De Wit, T. Hughes, S. van der

Leeuw, H. Rodhe, S. Sörlin, P. K. Snyder, R. Costanza, U. Svedin, M. Falkenmark, L. Karlberg, R. W. Corell, V. J. Fabry, J. Hansen, B. Walker, D. Liverman, K. Richardson, P. Crutzen, and J. Foley. (2009). "Planetary boundaries: exploring the safe operating space for humanity." *Ecology and Society* 14 (2).

Ross, H. and Berkes, F. (2013) "Community Resilience: A Rejoinder to Debra J. Davidson." *Society & Natural Resources: An International Journal* 26 (1): 25-29.

Ross, H., Cuthill, M., Maclean, K. Jansen, D. and Witt, B. (2010) *Understanding, Enhancing and Managing for Social Resilience at the Regional Scale: Opportunities in North Queensland*. Report to the Marine and Tropical Sciences Research Facility. Reef and Rainforest Research Centre Limited, Australia, Cairns.

Rossing, T; Otzelberger, A; and Girot, P. (2014) "Scaling-up the use of tools for community-based adaptation: Issues and challenges." In *Community-based Adaptation to Climate Change*, eds. Lisa Schipper, Jessica Ayers, Hannah Reid, Saleemul Huq and Atiq Raham. Oxon: Earthscan/Routledge.

Scannell, L. and Gifford, R. (2010b) "The relations between natural and civic place attachment and pro-environmental behavior." *Journal of Environmental Psychology* 30: 289-297.

Schwarz, A.M., Bene, C., Bennett, G., Boso, D., Hillv, Z., Paul, C., Posala, R., Sibiti, S., Andrew, N. (2011) "Vulnerability and resilience of remote rural communities to shocks and global changes: empirical analysis from Solomon Islands." *Global Environmental Change* 21: 1128-1140.

Sherrieb, K., Louis, C. A., Pfefferbaum, R. L., Pfefferbaum, B., Diab, E. and Norris, F. H. (2012) "Assessing community resilience on the U.S. coast using school principals as key informants." *International Journal of Disaster Risk Reduction* 2: 6–15.

Smit B, Wandel J. (2006) "Adaptation, adaptive capacity and vulnerability." *Global Environmental Change* 16: 282–292.

Staeheli, L. A. (2008) "Citizenship and the problem of community." *Political Geography* 27: 5-21.

Stedman, R. C. (2003) "Is it really just a social construction?: The contribution of the physical environment to sense of place." *Society and Natural Resources* 16: 671-685.

Steiner, A. and Markantoni, M. (2013) "Unpacking community resilience through Capacity for Change." *Community Development Journal*, doi: 10.1093/cdj/bst042. First published online: August 1, 2013.

Strauss, A. (1987) *Qualitative Analysis for Social Scientists*. Cambridge University Press.

Strauss, A. and Corbin, J. (1990) *Basics of qualitative research. Grounded theory procedures and techniques*. Thousand Oaks, CA: Sage.

The Guardian. (2010) Cornwall mops up after devastating flash floods, Thursday 18 November 2010 [Online] At: <http://www.theguardian.com/environment/2010/nov/18/cornwall-flash-floods-weather> (Accessed 5 August 2014).

The Guardian. (2014a) England and Wales hit by wettest winter in nearly 250 years, Thursday 27 February 2014 [Online] At: <http://www.theguardian.com/uk-news/2014/feb/27/england-and-wales-hit-by-wettest-winter-in-nearly-250-years> (Accessed 4 August 2014).

The Guardian. (2014b) Winter floods could batter England again if cuts not reversed, MPs warn, Tuesday 17 June 2014 [Online] At: <http://www.theguardian.com/environment/2014/jun/17/winter-floods-england-cuts-mps-report> (Accessed 4 August 2014).

Tol R, Yohe, G. (2007) "The weakest link hypothesis for adaptive capacity: an empirical test." *Global Environmental Change* 17: 218–227.

Tompkins, E. L. and Adger, W. N. (2004) "Does Adaptive Mangement of Natural Resources Enhance Resilience to Climate Change?" *Ecology and Society* 9: 10.

Twigger-Ross, C., Kashefi, E., Weldon, S., Brooks, K., Deeming, H., Forrest, S., Fielding, J., Gomersall, A., Harries, T., McCarthy, S., Orr, P., Parker, D. and Tapsell, S. (2014) *Flood resilience community pathfinder evaluation. Rapid evidence assessment. February 2014*. London: Department for Environment Food & Rural Affairs (DEFRA).

Ungar, M. (2011) "The social ecology of resilience. Addressing contextual and cultural ambiguity of a nascent construct." *American Journal of Orthopsychiatry* 81: 1–17.

Vaitla, B., Tesfay, G., Rounseville, M., and D. Maxwell (2012). *Resilience and Livelihoods Change in Tigray, Ethiopia*. Feinstein International Center, Tufts University. October 2012.

Vaske, J. J. and Kobrin, K. C. (2001) "Place attachment and environmentally responsible behavior." *Journal of Environmental Education* 32: 16–21.

Walliman, N. (2006) *Social Research Methods*. UK: SAGE Publications Ltd.

WCED (World Commission on Environment and Development). (1987) *Our Common Future*. Oxford: Oxford University Press.

Wells, M. (2010) "Resilience in older adults living in rural, suburban and urban areas." *Online Journal of Rural Nursing and Health Care* 10: 45-54.

Westley, F., Goebey, S., Robinson, K. (2012) *Change Lab/Design Lab for Social Innovation*. Canada: Waterloo Institute of Social Innovation and Resilience.

Whittle, R., Medd, W., Deeming, H., Kashefi, E., Mort, M., Twigger-Ross, C., Walker, G., Watson, N. (2010) *After the rain – Learning the lessons from flood recovery in Hull*. Lancaster University, UK.

Wilson, G. A. (2012a) *Community resilience and environmental transitions*. Oxon: Routledge.

Wilson, G.A. (2012b) "Community resilience, globalization, and transitional pathways of decision-making." *Geoforum* 27 (2): 115-131.

Wolf, J., Adger, W.N., Lorenzoni, I. (2010) "Heat waves and cold spells: an analysis of policy

response and perceptions of vulnerable populations in the UK. *Environment and Planning A* 42: 2721-2734.

Appendix 1: Community resilience assessment survey

Lucy Faulkner_Resident Questionnaire_May 2014



My name is Lucy Faulkner and I'm a Masters in Research student at the Penryn campus, University of Exeter. I'm currently undertaking research as part of my course. If possible, it would be fantastic to speak with you about your local community as part of my research for around 10 minutes.

The aim of my research is to look at how different factors make communities living in Boscastle and Wadebridge (in North Cornwall) resilient to significant events or problems they currently face or may face in the future. An example of such a factor is how one feels about the place where they live.

I will write up the results of this research into a written document, which will be submitted to the University of Exeter for marking. A copy of my research will also be submitted to the university library and will be available online.

If you are willing and you agree to participate in this research, your name will **not** appear or be used in my final research study, as I will not record your name on the survey that I would like to complete with you. Also, I will not share with anyone else the personal information you discuss with me.

Date: _____

Field site: ☐ Boscastle ☐ Wadebridge

1. Community resilience characteristics

The following statements are possible descriptions of you and your community. To what extent do you agree with each statement?

Response Options: 1 Strongly Disagree 2 Disagree 3 Neither Disagree Nor Agree 4 Agree 5 Strongly Agree

I. Place attachment

1. My community is a safe place to live.	1	2	3	4	5
2. I am proud to tell others where I live.	1	2	3	4	5
3. I would be sorry to leave this place.	1	2	3	4	5
4. This place is a part of myself.	1	2	3	4	5
5. I know this place very well.	1	2	3	4	5
6. I miss this place when I am not here.	1	2	3	4	5
7. I have a sense of belonging to my community.	1	2	3	4	5
8. People in my community feel like they belong to the community.	1	2	3	4	5

II. Leadership

9. My community has effective leaders.	1	2	3	4	5
10. People in my community communicate with leaders who can help improve the community.	1	2	3	4	5
11. People in my community trust local decision makers.	1	2	3	4	5
12. Leadership opportunities are available to people who live in my community.	1	2	3	4	5
13. Concerns of people in my community are heard by community leaders.	1	2	3	4	5
14. Concerns of people in my community are addressed by community leaders.	1	2	3	4	5
15. I drive activities that are beneficial for the community forwards.	1	2	3	4	5

III. Community cohesion and efficacy

16. People in my community are committed to the well-being of the community.	1	2	3	4	5
17. People in my community care for and help each other.	1	2	3	4	5
18. People in my community work together to improve the community.	1	2	3	4	5
19. My community treats people fairly no matter what their background is.	1	2	3	4	5
20. Good relationships exist between various groups in my community.	1	2	3	4	5
21. I can count on people in my community to help me in a crisis situation.	1	2	3	4	5
22. People in my community trust each other.	1	2	3	4	5
23. I take part in local activities that benefit the community.	1	2	3	4	5
24. My community has the capacity to be effective and get things done.	1	2	3	4	5

IV. Community networks

25. My community works with organizations and agencies inside the community to get things done.	1	2	3	4	5
26. My community works with organizations and agencies outside the community to get things done.	1	2	3	4	5
27. People in my community know where to go to get things done.	1	2	3	4	5
28. People in my community are friends with their neighbors.	1	2	3	4	5

V. Knowledge and learning

29. My community looks at its successes and failures so it can learn from the past.	1	2	3	4	5
30. My community has learned from past crises which might help the community to respond to and recover from future crises.	1	2	3	4	5
31. Knowledge of past community crises is communicated to others in the community so that there is widespread benefit of this information.	1	2	3	4	5

32. People in my community have access to informal learning that may improve the community's ability to respond to and recover from crises. E.g. access to learn from each other in the community, or from small groups.	1	2	3	4	5
33. People in my community have access to more formal learning that may improve the community's ability to respond to and recover from crises. E.g. night school classes, leaflets from the Environment Agency, training from another organization.	1	2	3	4	5
34. People in my community would know what to do in a crisis.	1	2	3	4	5
35. My community develops skills and knowledge to solve its problems and reach its goals.	1	2	3	4	5

2. Further information

“Resilience” is defined as the ability to thrive in a situation characterized by change and uncertainty, and to quickly return to routine following a ‘crisis’ event.

(For example, such change could be changes in weather-related conditions such as the recent winter storms, or other situations seen as a ‘crisis’ for you and your community).

To what extent do you agree with the following statements?

36. My personal level of resilience is high.	1	2	3	4	5
37. My community's level of resilience is high.	1	2	3	4	5

38. What are the main challenges faced by your community? (Weather-related, socio-economic etc.)

39. In addition to what has been discussed above, what other attributes do you think make your community resilient?

40. What does “my community is resilient” mean to you in 3 words?

41. Is there anything else you would like to add?

3. Background information

1. **Gender** ☐ Female ☐ Male

2. **How old are you?** ☐ 18-24 ☐ 25-34 ☐ 35-44
☐ 45-54 ☐ 55-64 ☐ 65+

3. **What is your marital status?**

☐ Married or civil partner ☐ Cohabiting ☐ Single ☐ Separated/Divorced ☐ Widowed

4. **What is your ethnic identification?**

☐ White / Caucasian ☐ Mixed (White and Black Caribbean/White and Black African/White and Asian/Other)
☐ Black or Black British (African / Caribbean / Other) ☐ Asian or Asian British ☐ Chinese
☐ Other ethnic group: _____

5. **What is your level of education?**

☐ GCSE /O-Level / vocational level 2 and equivalents ☐ A-Levels / vocational level 3 and equivalents
☐ Degree / Higher University Degree / Higher education equivalent
☐ Other vocational / other qualifications: _____ ☐ None of the above

6. **What is your employment status?** ☐ Employed ☐ Unemployed ☐ Retired ☐ Student

☐ Looking after home/family ☐ Disabled ☐ Other

7. **How many people live in your household?** _____

8. **How would you define your economic status?**

The average income in the UK is £26, 500. Please mark the most suitable answer:

Much less than the average.	Less than average	About average	More than average	Much more than average
1	2	3	4	5

9. How long have you lived in this community? _____

10. What is the source of your **greatest** connection to your community? (Tick only one response)

☐ Family ☐ Friends ☐ School ☐ Work ☐ Civic club ☐ Faith-based organization

☐ Other (please specify): _____

4. Follow up

Would you be willing to take part in a FGD for a maximum of 2 hours at some point in the next 4 weeks either during the day or evening? If yes:

a) what is your phone number? _____

b) what is your email address? _____

** Interviewer self-assessment of respondent:*

Appendix 2: FGD questions asked in Boscastle and Wadebridge

1) Place attachment

- All residents who completed my survey stated that overall they had a strong attachment to [Boscastle/Wadebridge]. Is this attachment important for community resilience? How important?
- Does everyone need to feel this attachment to build community resilience, or do only key individuals? Why?
- Does this attachment to [Boscastle/Wadebridge] influence your interest/motivation in undertaking actions that support the community? How? Why?
- Has your experience/memory of how the community coped with the 2004 floods contributed to your attachment to Boscastle? How? Why?
- Having a strong attachment to a place is often seen as a positive thing, but only up to a certain point. Research shows that some people with a strong attachment to where they live are prepared to live with potentially harmful risks (eg living in dangerous places, unhealthy livelihoods). Does this have any relevance to [Boscastle/Wadebridge]?

2) Community networks

- Is this important for building community resilience? How important?
- Do you trust other stakeholders outside of the community (such as National Trust, Environment Agency, regional policy-makers)? Why/why not?
- Do you network with other local communities/communities in the region? If so, how and why?
- What (if anything) undermines the community?

3) Community cohesion and efficacy

- Is this important for building community resilience? How important?
- The majority of residents who completed my survey stated that the 2004 floods in Boscastle brought people together. Has this unity lasted? Why/why not?
- How important is it for this unity to last in Boscastle when building community resilience over a longer time period? Do the ties and trust built up in 2004 help you to deal with other events (short-long, specific-general)?
- How self-reliant is this community in dealing with its problems?

4) Leadership

- Is leadership important for building community resilience? How important?
- What would effective leadership that would support building community resilience in [Boscastle/Wadebridge].look like? How is it different to the current community leadership?
- Are there individuals that have taken on informal/formal community leadership roles based on a belief in their ability to create change?
- Did any key community leaders emerge during the Boscastle 2004 floods? Who? Why? And are these individuals still considered leaders?
- Which individuals/groups are involved in community decision-making?
- Are any individuals/groups absent from this process that should be involved? Who? Why?
- Do you think the community can influence things and make changes happen? Why/why not? Do you feel empowered to act?

5) Knowledge and learning

- Is this important for building community resilience? How important?
- Do community decision-makers have access to the information/expertise needed to make decisions?
- Is "expert" knowledge available to support community decision-making? Why/why not?
- Is community knowledge available for use by regional institutions/policy-makers? Is it used?
- Key regional institutions believe a new discussion with the community about risk management is needed. What should this discussion include from your perspective?
- The majority of residents in Boscastle that completed my survey stated that the community would know what to do in a crisis (following the 2004 floods). How can this knowledge continue into the future so that community capacity is long lasting?
- How much opportunity is there to meet with other community members (and institutions) to generate/exchange ideas to cope with community problems?
- Is there an exchange of local knowledge/skills from older to younger generations, and visa versa? If so, how?

6) Concluding question

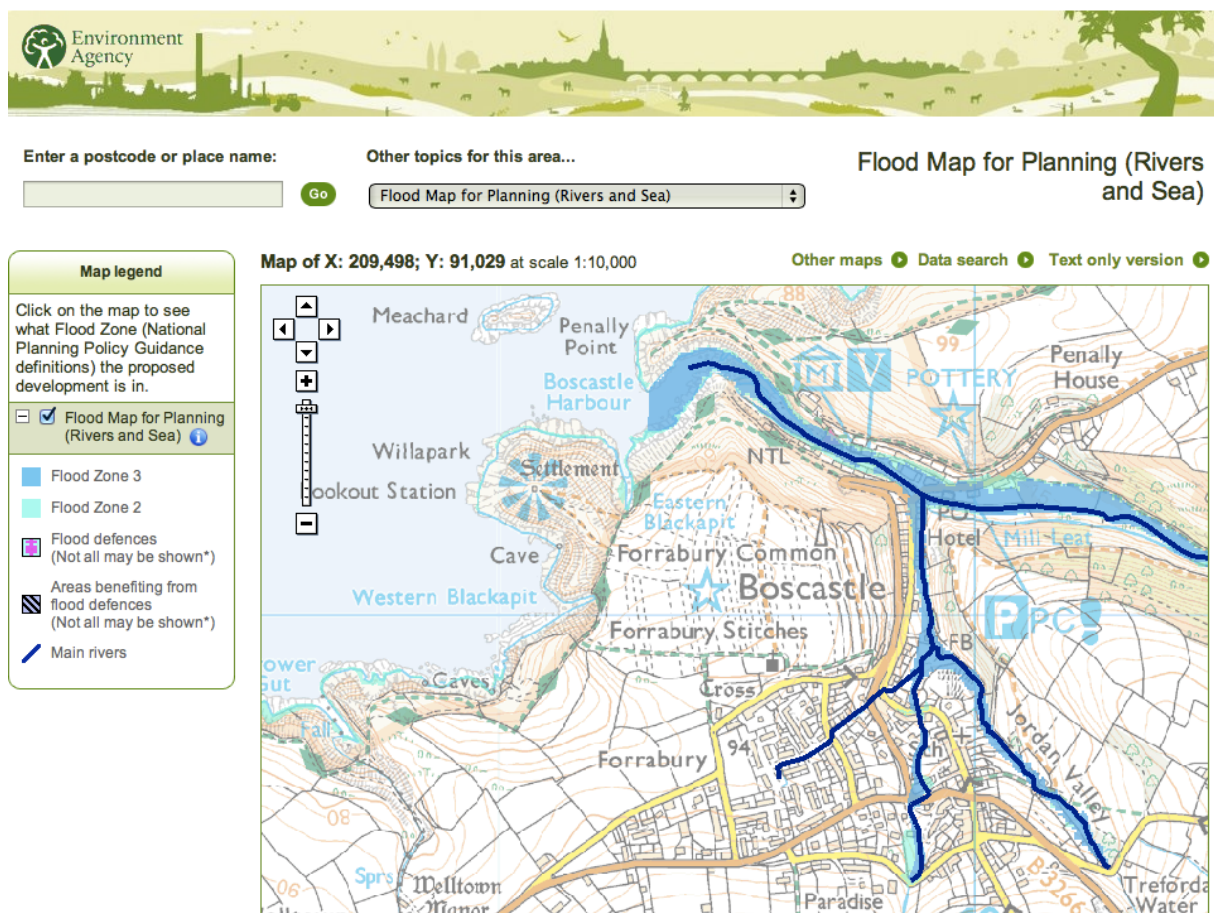
- Out of the five community resilience characteristics discussed, what order of importance would you rank them in from 1-5 (with 1 being the most important)? Why?

Appendix 3: MAGIC project KII details

A KII with a key regional institutional agent of change relating to community resilience in field sites was shared with the author courtesy of the MAGIC project. This was with Phil Dyke, Coast and Marine Adviser at the National Trust.

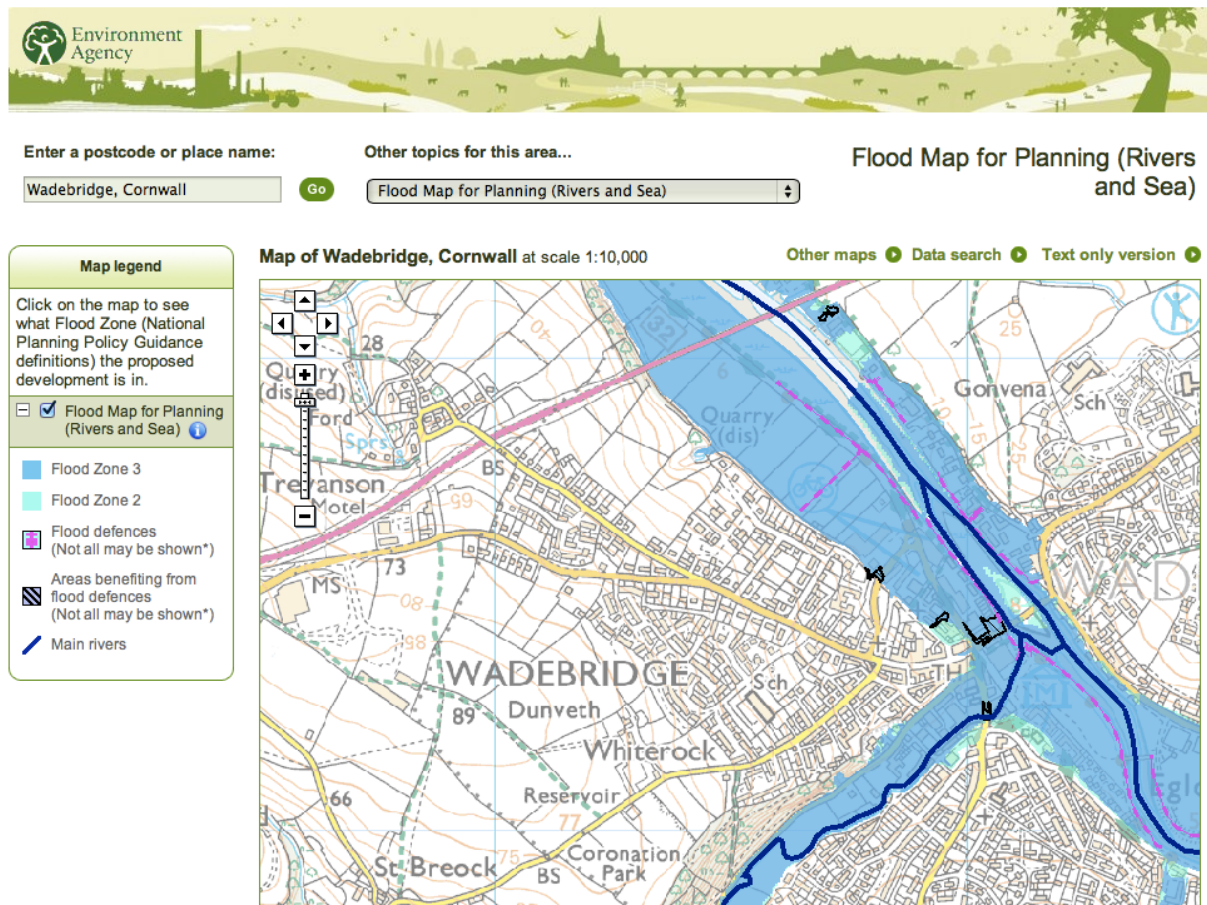
Appendix 4: Environment Agency flood risk maps used for sampling purposes

Boscastle



Source: http://maps.environment-agency.gov.uk/wiyby/wiybyController?lang=_e&topic=floodmap&layer=default&ep=map&layerGroups=default&scale=11&x=209498&y=91029

Wadebridge



Source: http://maps.environment-agency.gov.uk/wiyby/wiybyController?value=wadebridge&submit.x=-242&submit.y=-146&submit=Search%09&lang=_e&ep=map&topic=floodmap&layerGroups=default&scale=11&textonly=off