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Published in:
Journal of Rural Studies

DOI:
[10.1016/j.jrurstud.2017.06.015](https://doi.org/10.1016/j.jrurstud.2017.06.015)

Publication date:
2017

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Document Version
Peer reviewed version

[Link to publication in Discovery Research Portal](#)

Citation for published version (APA):

Connon, I. (2017). Extreme weather, complex spaces and diverse rural places: An intra-community scale analysis of responses to storm events in rural Scotland, UK. *Journal of Rural Studies*, *54*, 111-125. <https://doi.org/10.1016/j.jrurstud.2017.06.015>

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Title Page

Article Title:

Extreme Weather, Complex Spaces and Diverse Rural Places: An Intra-Community Scale Analysis of Responses to Storm Events in Rural Scotland, UK.

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Keywords: Resilience; Intra-community; Diversity; Adaptation; Scotland; Extreme Weather;

Abstract:

The impacts that increasing rural demographic and socio-cultural diversity has had upon the responses of rural community members to weather-related hazard events has remained relatively understudied within the Disaster Risk Reduction scholarship. Drawing upon interview evidence obtained from a study of three rural communities in Scotland, UK, the article explores how variation in length of residence amongst community members affects abilities to cope during periods of extreme weather, with long-term residence being associated with more positive outcomes than more recent in-migration. The article suggests that differences in responses between long-term residents and more recent in-migrants results from a complex array of differences in exposure to previous storm events, differences in occupational backgrounds that result in differences in ways of relating to the land, and differences in social relationship preferences and expectations. The article makes the claim that policies and practices of Disaster Risk Reduction, including the Scottish Community Resilience initiatives, need to focus more on the intra-community scale in rural settings in order to better protect residents from the risks that extreme weather poses to human well-being. In their present form, Scottish Community Resilience initiatives are likely to be limited in their ability to improve the storm-coping abilities of residents because their implementation at the whole-community scale reflects outdated assumptions about the character of rural communities and ignores the impacts of several decades of demographic change. The findings also raise questions about how the knowledge that enables successful adaptation to environmental hazard events can be effectively mobilised within increasingly complex and diverse societies.

Ethics Statement

The research that this article is based upon was approved by the University of Dundee Ethics Committee and carried out in accordance with the University Code of Practice for non-clinical research ethics on human participants. The informed consent of all interview participants was obtained in writing and all interview participants whose information has been included in the study gave permission for the information to be published in academic journals and other relevant outputs. I also certify that all sources of funding have been fully acknowledged. I, as author of this article, confirm that the article is my own original work and has not been published previously and is not under consideration for publication elsewhere. I understand and confirm that if the article is accepted for publication, it will not be published elsewhere in the same form, in English or any other language, including electronically without the consent of the copyright-holder. I am happy for my article to be cross-checked using relevant anti-plagiarism or CrossCheck software.

Highlights

- Length of residence influences personal ability to cope during storm events
- Differences in coping ability exist between long-term residents and recent in-migrants
- Previous experience, occupation and social relationships influence responses
- Whole-community approaches to resilience are inconsistent with community complexity
- Capacities for knowledge transmission between diversifying social groups is limited

Extreme Weather, Complex Spaces and Diverse Rural Places: An Intra-Community Scale Analysis of Responses to Storm Events in Rural Scotland, UK.

1.0: Introduction

While scholars working within the field of climate change mitigation have moved beyond referring indistinctly to different socio-cultural groups, the implications of increasing demographic and socio-cultural diversity within Western rural settings for Disaster Risk Reduction have remained relatively underexplored. This paper suggests that a recent Scottish Government weather-related hazard mitigation initiative, like many other centrally-controlled disaster response developments, underestimates the importance that increasing demographic change and socio-cultural diversity has on shaping local responses to emergency events (see Berkes and Ross, 2013; Norris et al, 2008; Lopez-Caressi et al, 2014; Shaw 2004; 2014, for discussion of the limitations of integrated community approaches to Disaster Risk Reduction). During the previous 5 years, the Scottish Government Community Resilience initiative has aimed to mitigate the risks posed to human well-being from increasing frequency, unpredictability, duration and intensity of extreme weather events, including flooding, heavy snowfall and high winds (Scottish Government, 2012a). However, it can be argued that this initiative lacks appreciation of the implications that increasing demographic and socio-cultural diversity has upon shaping local residents' responses to the impacts of global climate change.

The development of Scottish Community Resilience initiatives arose from a recognition that extreme weather events, including flooding, heavy snow and unpredictable seasonal weather patterns, have been increasing in both frequency and severity (Scottish Government, *ibid*). Data gathered over the previous 40 years has shown that average temperatures in Scotland have increased by 0.5 C⁰ since 1914 (Kendon et al, 2016). Since 1961, most areas have experienced significant rises in precipitation, resulting in increases in the frequency of major floods and landslides (*ibid*). According to current predictions, the frequency of flood-related events is likely to increase further over the next 50 years (Hulme and Jenkins, 1998; Hulme et al, 2001; IPCC, 2013, Scottish Government, 2014). Although snowfall levels are predicted to decline over the next 50 years, for the past 8 years Scottish communities have been affected by increasing numbers of particularly severe and prolonged snowstorms, including on the west coast which does not normally experience the same amount of snowfall as the higher

mountainous northern regions (Kendon et al, 2016, Scottish Government, 2014). Furthermore, these snowstorms have often occurred during March and April, rather than during the mid-winter months (Kendon et al, *ibid*; Scottish Government, *ibid*). In addition, Scotland has experienced an increase in the severity of gale force winds, which disrupt travel, infrastructure and energy supplies.

To mitigate the risks to human well-being that severe weather poses, the Scottish Government placed the establishment of Community Resilience Committees in both urban and rural communities at the heart of its approach to weather-related vulnerability prevention. In rural settings the Scottish Government has focused on establishing one Community Resilience Committee per each single village location. This differs from their approach to urban areas, where efforts have been made to set up a number of different Community Resilience groups within a particular postcode area, in recognition of the multiple social groups that can exist within a single area (Scottish Government, 2012b). While ‘rural’ can be defined according to functional criteria, such as a high dependence on agricultural employment, the Scottish Government’s approach reflects a traditional definition of rural spaces as one that is based on population density. The Scottish Government also defines rural communities as a single communities, based upon their location (Scottish Government, *ibid*). This implies that rural communities exist as single, bounded, homogenous wholes, devoid of the diverse communities-within-communities that characterise more densely populated urban areas. Scottish Government policies also remain underpinned by this simple urban-rural classification scheme, which defines a rural settlement as one with a population of less than 3000 (Scottish Government, *ibid*). This can be further divided in terms of accessible rural locations, which are located within a 30 minute drive of a town with a population of at least 10,000, and remote rural locations (*ibid*). Nearly one fifth of the Scottish population live in rural areas (*ibid*).

Over the previous fifty years, the rural population of Scotland has increased substantially as a result of in-migration (Champion et al, 1998; Defra, 2013; Scottish Government, 2012c). Existing scholarship emphasises how the decline of the agricultural and fishing industries, the growth of oil-related wealth and an increasing financially secure ageing population has affected rural migration patterns and changed the socio-cultural and demographic makeup of rural communities (De Lima, 2012). Thirty years ago, the majority of in-migrants were either White Scottish or White British, and were either wealthy retirees or middle-aged

professionals (De Lima, *ibid*). Although the majority of contemporary in-migrants are also White Scottish or White British wealthy retirees and middle-aged professionals, since 2007 rural Scotland has also become home to a number of European in-migrants employed in the seasonal agriculture and tourism industries (De Lima, *ibid*). As a result of increasing rural in-migration, villages have expanded in size, new settlements have sprung up and less remote small rural villages have been transformed into larger commuter villages. Consequently, the social characteristic of rural villages has been described as having become increasingly fragmented, with the emergence of communities-within-communities, made up of community members with shared interests rather than on the basis of shared residential location alone (see Mackenzie, 2004; 2006, Mackinnon, 2002; The Scottish Government, 2010; Shucksmith and Philip, 2000, for further information on social-demographic change in rural Scotland).

While Scottish rural society has undergone these significant changes, the UK and Scottish Governments have increasingly faced accusations of demonstrating an urban bias in their policy developments. It is argued that this bias has resulted in the marginalisation of rural problems, such as crime, poverty and the closure of rural businesses; and also displays a lack of consideration towards the problems being faced by an increasing in-migrant population (see Bailey et al, 2016; Barclay et al, 2004; Commins, 2004; Hirsch et al, 2013; Milbourne and Doheny, 2012; Shucksmith and Philip, 2000). This bias may partly result from the binary rural-urban classification embedded in Government policy, which renders rural problems as the antithesis to urban problems (Weisheit, 2005; Wiles, 1999). However, concerns about the marginalisation of rural issues are also based upon evidence that assumptions about rural areas as simple and homogeneous in terms of their demographic and socio-cultural character have significantly influenced both the design and enactment of rural policies (Barclay et al, 2004; Donnermeyer, 1997; Garland and Chakraborti, 2004; Lee et al, 2005; Satsangi et al, 2011; Shortall and Shucksmith, 2001; Shucksmith, 2000). As rural populations remain smaller than populations in urban areas, it tends to be assumed that rural residents possess greater degrees of familiarity with one another, a better developed sense of community and a greater degree of social stability than their urban counterparts (Hirsch et al, 2013; Weisheit, 2005). Rural communities in the UK are also assumed to more likely to demonstrate 'self-reliance' and a more stoic attitude in the face of adversity (see Cloke et al, 1994; Commins, 2004; Shucksmith, et al 1994).

These assumptions about the character of rural Scottish communities also underpins the implementation of Scottish Community Resilience initiatives within rural areas. These initiatives have been rolled out on a village-by-village basis in rural areas and senior Government officials and emergency service personnel continue to express beliefs that rural citizens are more likely than their urban counterparts to be better prepared for weather-related emergencies, be more likely to be able to cope with and adapt to the impacts of severe weather, and be more likely to be able to depend upon each other for support (see Fazey et al, 2017, and Lyon and Fazey, 2015, for further information about the rolling out of Community Resilience plans in Scotland). However, it can be argued that this approach fails to fully appreciate the extent to which demographic change has affected residents' abilities to cope with weather-related hazards. It also reveals reluctance on behalf of Government officials to move away from conceptualisations of rural spaces that perpetuate assumptions of rural communities as apolitical and socio-culturally homogenous, despite the existence of a growing body of scholarship that challenges these notions of passivity and homogeneity (Chakraborti and Garland, 2004; De Lima, 2012; De Lima and Wright, 2009; Philo, 1992; Smith, 2007). Scotland's rural population is also expected to rise further to 5.54 million by 2033, with inward migration trends amongst retired populations predicted to continue (Scottish Government, 2010). Given the predicted population increase, predictions of increasing severe weather, and the Scottish Government's current outdated approach to policy-making for rural areas, it follows that an increasing number of rural residents are likely to face an increased risk of harm during future storm events. Furthermore, if rural settings are becoming more demographically and socio-culturally heterogeneous, the impacts of severe weather events are likely to be experienced less evenly amongst community members. This presents an important consideration for the scholarship, policy and practice of Disaster Risk Reduction, as the diversity of communities, the intricacies of local politics, and the influence of socio-historical inequalities often remain absent from official frameworks and scholarly accounts (Cox and Perry, 2011; Maldonado, 2016).

This paper claims that policy developments and practices that focus on enhancing community resilience to the impacts of climate change need to be reconsidered and implemented at the intra-community scale to ensure that they meet the needs of an increasingly diverse rural population. Using empirical evidence derived from long-term qualitative research examining residents' personal experiences of recent storms within three Scottish rural communities, the Scottish Government's mobilisation of hazard risk reduction at the whole-village scale can be

argued to reflect inaccurate, oversimplified and outdated assumptions of demographic and socio-cultural homogeneity, as well as pre-conceived ideas about how severe weather is perceived and adaptive skills transmitted. By analysing how patterns of recent demographic change and increasing socio-cultural diversity affect residents' storm response coping abilities at the intra-community scale, I argue that differences in levels of experience of previous weather-related adversity, occupational background and patterns of social relationships between long-term residents and more recent in-migrants result in significant differences in storm coping capacities. In addition, the experiences of recent in-migrants reveals that residents who are less familiar with local social and ecological environments can experience levels of distress or 'ontological insecurity' during severe storms that are on a par with persons affected by major internationally-reported environmental hazard events. Ontological insecurity or 'lifescape change' is more commonly associated with large-scale technological disasters, such as an oil spill, and consists of perceptions of isolation, abandonment, distrust and loss of control over one's future destiny (Edelstein, 2004: 125-128, 136-142; Edelstein et al, 2007). A person's ontological security becomes threatened in situations where chaos results in high levels of uncertainty and leads to a disconnection from underlying expectations about how the world operates (Giddens, 1991: 47). Rural in-migrants can therefore be viewed to be at greater risk of psychological harm than other residents during particularly severe storms.

However, these risks of harm may be particularly difficult to overcome by word-of-mouth knowledge transmission alone. This is due to the low levels of 'bridging' and 'bonding' social capital that exist between recent in-migrants and longer-term residents, and differences in employment and leisure pursuits that result in different ways of relating to the environment. While bonding social capital refers to networks between homogenous social groupings, enabling them to band together to support collective needs (Putnam, 2000; 2002), the evidence from this study suggest an absence of *bonding* capital at the whole community level in present in contemporary rural settings. In addition, although bonding capital is present within groups of long-term residents, it appears to be significantly lacking amongst the more loosely connected groups of in-migrants. Furthermore, a lack of *bridging* capital, defined as networks between the different social groups (Putnam, 2000; 2002), suggests that efforts to transmit adaptive knowledge between different community groupings via Community Resilience initiatives are likely to be limited in terms of their success. Also, rather than being transmittable in propositional form, the knowledge that enables effective adaptation amongst

long-term residents is tacit, experientially-based in form and obtained from long-term observation of the local environments over many years. This therefore leads to questions about how recent in-migrants can access the knowledge necessary to enable them to cope more effectively during storm events.

According to systems-based theories, community resilience to weather-related phenomena can be defined as the capacity of community systems to withstand, absorb and adapt to shocks and stresses brought on by environmental change (McCarthy et al, 2001: 89). Adaptive capacity is defined as the ability to adapt ‘by adjusting to, moderating the potential damages of, taking advantages or opportunities created by, or coping with the effects of global climate change’ (Crate, 2008: 571). These definitions will be used throughout the paper. The paper begins with an overview of the scholarly and empirical background of developments in resilience-based approaches to Disaster Risk Reduction. This is followed by a description of the methods used to conduct the study, an examination of the study findings and a discussion of the implications of the study for developments in the policy and practice of Disaster Risk Reduction.

2.0: Context

Studies that examine community responses to hazards, disasters and environmental change focus on how social structures, cultural beliefs, values, attitudes and perceptions of community residents affect abilities to prepare for and respond during times of crisis (Azim and Islam, 2016; Kruger et al, 2015). Understanding how communities respond to disasters is viewed as integral for the development of effective Disaster Risk Reduction (Kruger et al, *ibid*; Olshansky, 2006; Rahman and Pokrant, 2015); and a recent wealth of research has explored potential ways of incorporating local knowledge, skill and experience into disaster management frameworks. However, the vast majority of developments that aim to reduce the risks and impacts of environments hazards for local populations remain underpinned by conceptual frameworks that adopt a systems-based approach to community resilience (Berkes and Ross, 2013; Kulig et al, 2013; Norris et al, 2008; Paton and Johnston, 2001), with community resilience being defined as the ability to cope with and adapt to environmental change. Systems theories view adaptive capacities as ground upon the overall functioning of all interconnecting parts of the total community system (Berkes, 2007; Walsh-Dilley, 2016). However, systems-based approaches to Disaster Risk Reduction have received considerable

criticism on the basis of that they do not fully address and incorporate power relationships and wider processes of social and political change that operate within community settings (Chandler, 2014a; Chandler, 2014b; Evans and Reid, 2013; 2014; Schmidt, 2015). Furthermore, the majority of empirical research focusing on the resilience of rural communities focuses on the assessing resilience at the whole community scale, with communities being defined according to geographies of place. Thus, questions of how social, political, cultural and economic diversity impact upon human responses to environmental crises remains relatively underexplored. In addition, while scholars focusing on hazard impacts in densely populated urban areas have noted the uneven spread of climate change effects and the challenges that urban social diversity presents for the development of effective disaster response strategies (see Cutter et al, 2003; Boruff and Cutter, 2007; Cutter et al, 2014; Meerow et al, 2016; Pelling, 2011; Pelling and Manuel-Navarrete, 2011), the scale that rural communities operate within continues to be taken for granted.

Scholars examining local forms of adaptation to environmental change often tend to turn towards non-western, remote, indigenous communities in their research, as the visibility of ontological differences and imbalances in power relations between governmental institutions and non-Western indigenous socio-political structures are more obviously distinct than, say, in two different western European contexts. This, in combination with an assumed ontological separation of the social and ecological environments in western socio-cultural contexts (Chandler 2014a; 2014b), has limited the extent to which diversity in hazard responses within Western rural communities has received scholarly attention. Even in the small number of studies from other areas of the world, where socio-cultural diversity and wider processes change have been recognised, the locus of attention has largely be given to the uneven power relationships that operate between local communities and wider national contexts (e.g. Nuttall and Callaghan, 2000; Crate and Nuttall, 2009; Kirsch, 1997), rather than the power relationships and diversities that operate within the communities themselves. This tendency to downplay socio-cultural variation can be argued to oversimplify and homogenise the reality of responses to environmental hazard events and risks marginalising the experiences of smaller, intra-community sub-groups.

Moreover, in the limited number of studies where systems-based hazard response models have attempted to incorporate intra-community variation within their frameworks, these developments rest on assumptions that the same principles of resilience that operate at the

whole community scale can also operate at the micro-scale (Norris et al, 2008). They also assume that adaptive knowledge and skill can be transmitted across the different groups that comprise the entire wider system, and that intra-community groups can self-organise and interconnect to mobilise this knowledge (Berkes and Ross, 2013). It is argued that community groups need to possess a high level of both bonding and bridging social capital to effectively mobilise knowledge throughout an entire system (Scannell and Gifford, 2010). Many previous studies have examined the role of social capital in the effective mobilisation of knowledge and skills for enhancing post-disaster adaptation (See Aldrich, 2012; Aldrich and Crook, 2008; Cox and Perry, 2011; Nakagawa and Shaw, 2004; Shimada, 2015; Woolcock, 1998). According to the social capital approach, communities that possess high levels of social capital can rely on their strong social networks for information and assistance to recover faster than others. However, as communities expand and become increasingly diverse, the potential for them to be able to communicate across and between the array of different sub-groups can be argued to be more complicated than assumed (Scannell and Gifford, *ibid*; Walker et al, 2009).

Additionally, these approaches also assume that the knowledge, skills and resources are easy to mobilise across the different social groups. The sharing of material resources, such as emergency heaters, camping stoves food supplies, or the sharing of practical information such as emergency helpline telephone numbers, may be transmitted relatively easily as long as residents have the capacity to communicate with each other. However, first-hand observations of local ecological environments and weather patterns are more tacit, experientially-based, and more difficult to communicate orally in propositional form. These forms of observational knowledge, often referred to as Traditional Ecological Knowledge, have been noted to enhance adaptive capacity in communities affected by natural disasters (Berkes et al, 2000; Gaillard, 2007; Mauro and Hardison, 2000). Phenomenological approaches to human-environmental relations and knowledge acquisition, such as Ingold's (2007) relational approach, stress that humans require ongoing interactions within a surrounding environment to be able to access these forms of knowledge. According to Ingold (*ibid*), knowledge is constructed through practical and sensory engagements with the environment and climatic phenomena, such as the wind. Humans learn to orient themselves and adapt in relation to it over long periods of time by observing and attending to its behavioural patterns (Ingold 2011: 6). Although Ingold's approach has not been explicitly applied within a hazard mitigation or Disaster Risk Response framework, it suggests that knowing the land through lived

experience rather than via the transmission of propositional knowledge is what is most significant for the development of skills necessary for enabling effective adaptation. This reveals a need for the scholarship and practice of Disaster Risk Reduction to consider the importance of direct, long-term human-environmental interaction for enhancing abilities to cope with environmental hazards events.

Rural Scotland offers an interesting, yet also underexplored geographic setting for examining intra-community scale variation in responses to climate change. This is because remains a strong tendency within much of the existing scholarship of Scottish society to focus on aspects of cultural ‘tradition’ rather than socio-cultural complexity. Rural communities tend to be described on the basis of similarity rather than difference, as if somehow set apart from and immune to socio-economic issues and processes of global change that penetrate rural spaces (see Hearn 2000; Hussain and Miller, 2006; Jedrej et al, 1997; Keating, 2007; Knox, 1999; McCrone, 2001 for criticisms of de-politicised scholarship of Scottish society and for examples of scholarship that present Scotland as a politicised, demographically and socio-culturally heterogeneous nation). Some notable exceptions to this ongoing trend have focused on perceptions and experiences of mental ill-health in rural contexts (Parr et al, 2004; Parr and Philo 2003), rural enterprise (Steinerowski and Steinerowska-Streb, 2012), land ownership (Chenevix-Trench and Philip, 2001; MacKinnon 2002), internet and communications technology (Townsend et al, 2013) and rural policing (Wooff, 2015). However, the vast majority of studies examining rural development in Scotland suggest that policy planning for rural areas continues to remain underpinned by assumptions that the character of rural communities continues to represent something from the distant past (Mackenzie, 2004; 2006; Satsangi et al, 2009).

The Scottish Government’s community-based approach to resilience operates within the broader legislative framework of emergency response planning under the Civil Contingencies (Scotland) Act of 2004. The drive towards including local communities within the emergency response management system led to the creation of Community Resilience Committees, which are based within the local communities themselves. Local residents are encouraged to become involved in these groups and to help create formal Community Resilience Plans consisting of voluntary support-structures. Designated roles and responsibilities are distributed between community members, with the aim of enabling them to be able to plan for and respond during periods of extreme weather, with resilience being defined as, “that which

maintains the continuity of our way of life or returning to relatively normality after a disruptive event” (Scottish Government, 2012a: 3). Local Authority and Community Council representatives oversee the implementation of these plans and provide the necessary financial resources. Although the system was developed at the central Scottish Government level, the policy is based on the idea that local people should be given the freedom to design their own community resilience plans in accordance with the needs of each specific local community. Therefore, although an externally-imposed response system, Community Resilience groups do, at least in theory, incorporate a degree of scope for local control over local affairs.

However, the conceptual frameworks that the Scottish Government’s approach to Community Resilience is based upon gives rise to questions about whether or not they have the potential to meet contemporary rural resident needs? Doubts may be raised about the potential effectiveness of these initiatives because they rest upon assumptions that: a) the majority of local residents are already in possession of the knowledge required for effective adaptation, and, b) that this knowledge can be translated into a formal written plan and readily adopted during future emergency situations. As the implementation of these initiatives is still ongoing, no study assessing the strengths and limitations of this approach has yet been published.

3.0: Methods

To explore how demographic and social change affects storm coping abilities at the intra-community scale, a study was designed to examine how community members in three case study sites had responded during recent periods of extreme weather.

3.1: Data Collection

A total of 42 semi-structured interviews were undertaken with local residents within 3 case study sites between September 2014 and May 2015, during 12 weeks of ethnographic fieldwork undertaken within each of the respective case study sites. The purpose of the ethnographic fieldwork was to observe and participate in community activities, in order to become familiar with the social, economic and culture dynamics embedded within each of the communities. It also allowed the modes of engagement: a) between the residents themselves, b) between residents and members of official government institutions, and c) between residents and the surrounding landscape, to be directly observed. In addition, the ethnographic

component enabled first-hand observations to be made of how residents responded to storm events during the winter of 2014 and how they engaged with other residents and the emergency service providers during the course of these events. The time spent within each community also afforded opportunities to build up trust and rapport with the study participants. This proved crucial for eliciting rich interview data pertaining to resident experiences and inner-most feelings of previous storm events.

The decision to conduct semi-structured interviews and to base the study's analysis upon the interview data was influenced by a body of scholarship that promotes capacity-driven approaches to overcoming inequalities in hazard mitigation and strives to overcome representational marginalisation in the development of Disaster Risk Reduction strategies (Campfrens, 1997; Kenny, 1996; Klein, 2005; Ozerdam and Jacoby, 2006; Pyles and Harding, 2001). According to this scholarship, traditional researcher-driven approaches to data collection, analysis and discussion risk perpetuating the marginalisation of those marginalised within their own communities and within the hazard reduction development context by privileging the voices and authority of the researchers over those whom they seek to represent. In contrast, allowing the voices of the research participants to guide the analysis helps to place them in the 'driving seat' of future developments and also emphasises the agency and autonomy of those who are often the least likely to be heard (Gunewardena and Schuller, 2008; Mulligan and Nadarajuh, 2011, Pyles and Harding, 2011; Telford and Cosgrove, 2007). This approach therefore enables the voices of recent in-migrants, who are often underrepresented in existing Scottish Community Resilience initiatives, to be fully represented within this study. For this reason, and where possible to do so without compromising requests for confidentiality, residents' own words have been included in the text, in the form of direct quotations taken from the interview transcripts.

The case study sites chosen consisted of: (1) the village of Arisaig and its surrounding area to the north of Fort William in Lochaber in the West Highlands of Scotland, (2) the village of Lochranza and the wider surrounding settlements on the Isle of Arran, off the west coast of Scotland, and (3) the village of Methlick in north east Aberdeenshire, on the east coast of Scotland. The study was approved by the University of Dundee Ethics Committee and carried out in accordance with the University Code of Practice for non-clinical research ethics on human participants. Thirteen interviews were conducted at Case Study Site 1, 19 at Case Study Site 2 and 10 at Case Study Site 3. Questions asked included: experiences of recent

extreme weather events, experiences of previous severe weather events within the local area, length of residence within the area, previous/current employment, social relationships within and outwith the community, views of official emergency response assistance during recent weather-related emergencies, and experiences of supporting other community members during these events.

The case study sites were specifically chosen after initial discussions with Government and emergency response personnel, who described Arisaig and the Isle of Arran as ‘exceptionally outstanding’ in terms of residents’ ability to cope without emergency support during severe weather and in terms of residents’ willingness to set up a formal Community Resilience Committee within each of the communities. The third site, the village of Methlick, was selected after discussion with senior emergency response personnel, who regarded Methlick as also being exceptional in terms of the coping abilities of its residents. All three sites had also undergone significant demographic change over the previous three decades. These communities therefore provided ideal locations for exploring whether differences were present between the storm coping abilities of long-term residents and more recent in-migrants and for examining whether any notable differences found were being adequately addressed within the Scottish Community Resilience initiatives.

3.2: Selected Case Study Sites: Arisaig, Lochranza and Methlick

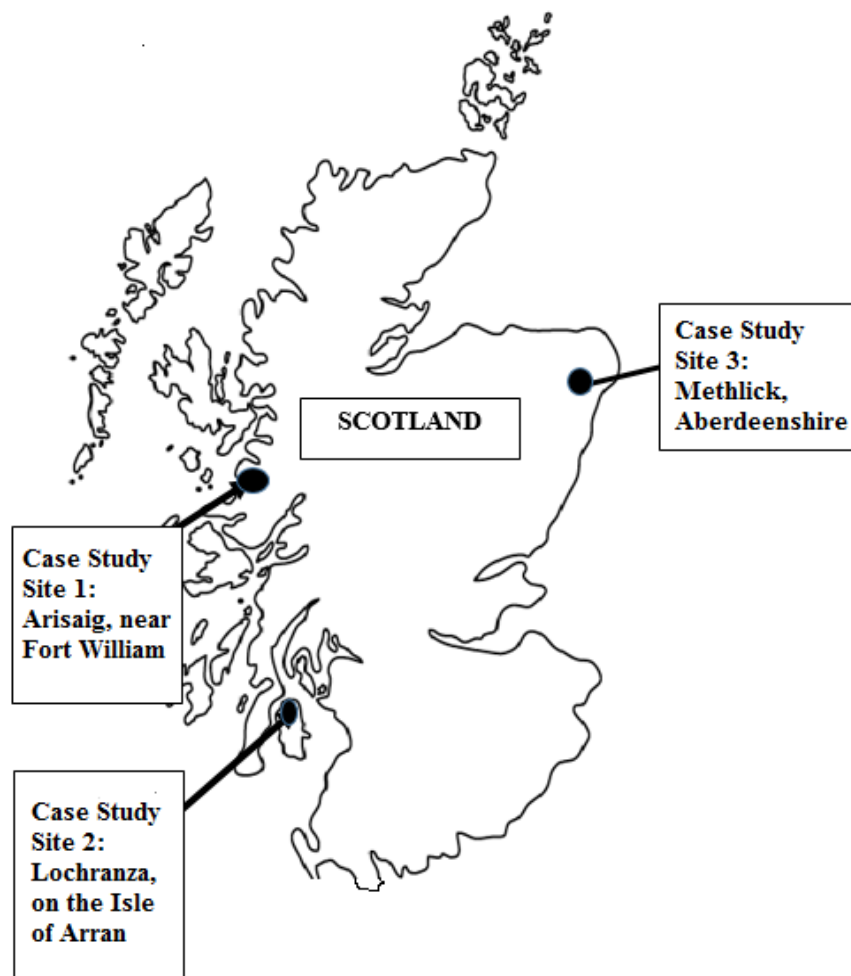


Figure 1: Map showing location of case study sites in Scotland, UK.

Arisaig was chosen as the first site. With a population of 272, it is located in the Lochaber area of the Highlands of the North-West of Scotland. One third of the population are over 60 years of age. Approximately 8% of homes are holiday homes and several clusters of new homes have been built within the village and surrounding areas. The majority of recent immigration has been from wealthy retirees and families headed by professionals aged between 40 and 55, earning above-average salaries. Arisaig was hit by snow, sleet, rain and hurricane-force winds of up to 165mph between December 2011 and January 2012. Power outages occurred throughout the region as trees were blown over and frost damaged the overhead power lines, leaving residents without power for up to four days at a time. Between December 2013 and January 2014, Lochaber residents were hit again with extreme high winds of up to

85mph and severe flooding in both coastal and inland areas. Between December 2014 and January 2015, residents experienced a combination of high winds and lightning storms.

The village of Lochranza, located on the north-side of the Isle of Arran, was selected for the second case study site. It has a population of 200, with 27% of residents aged 65 and over. An area of low socio-economic deprivation, rising numbers of holiday homes have recently appeared within the area. The Island was affected by extreme winter weather in March 2013, with a prolonged heavy snowstorm, freezing temperatures, high winds and snow drifts of up to 15ft high. Residents experienced power outages for up to five days. Schools were closed and water supplies disrupted. Transport restrictions resulted in the north of the island running out of logs that provided an alternative heating source for many of Lochranza's residents. Local Mountain Rescue volunteers attempted to clear snow to allow access for emergency responders and medical staff to attend elderly and disabled residents. However, efforts to keep the roads open were limited by the severity of the weather. Residents reported that the storm, now referred to locally as 'snowmageddon', was exceptionally severe and unusual in the timing of onset, as it occurred in late March and began so suddenly that no advance weather warning was able to reach the local area in time to enable residents to plan accordingly.

The village of Methlick, has a population of 442. It is located in North East Aberdeenshire and was selected as the third case study site. Traditionally, this was an area characterised by mixed farming and crofting, but with the decline of the agricultural industry and the rise of the oil industry in the nearby city of Aberdeen, the village has seen a huge rise in the in-migration of oil industry employees since the 1980's. Many farmsteads have been converted into exclusive detached dwellings. The village also contains a high number of elderly residents, but the majority of these are long-term residents, rather than in-migrating retirees. Several new private housing settlements were built during the previous 15 years. North Aberdeenshire was severely affected by power outages, high snow, heavy rain and winds during the Scotland-wide winter storms of December 2014 and January 2015.

3.3: Data Analysis

All interview materials were transcribed and analysed according to thematic contents and verified using N-Vivo software. To explore intra-community variation in coping abilities, responses were sub-divided into three categories according to length of residence within each

respective locality: (1) Has lived in the village for at least 15 years, (2) Has lived in the village for between 5 and 15 years, and (3) Recent in-migrant residents arriving within the last five years and those with second homes who do not stay in the area on a permanent basis. Residents grouped in category 3 were initially sub-divided into a split category of: a) those arriving within the previous five years, and, b) those with second homes within the area. However, with 80% of second home owners having bought their home within the previous five years and 100% within the previous ten years, and, with all being relatively wealthy, urban dwellers, above age 50 and very similar in terms of demographic profile to those who had moved permanently to the area within the past five years, a decision was taken to combine the responses of these groups into one category. All residents from this category share an absence of long-term connection to the local area, unlike those in categories 1 and 2.

Data were analysed to examine residents' self-reported ability to cope during storms, with statements indicating ability to cope on one's own, knowing where and who to turn to for help being coded as positive experiences, along with descriptions of calmness, resourcefulness and being prepared. In contrast, descriptions of events as a crisis, disruptive, isolating, severe, and reports of feeling afraid, upset and abandoned, and reconsiderations about whether or not to remain in the area as a result of the storms, were coded as negative experiences. Descriptions of prior experiences of severe weather and answers to questions that focused on social relationships and employment experiences were examined to explore how they related to resident self-perceptions of storm-coping abilities during the most recent storm events. Findings were examined in relation to the place-based rural community definition that Scottish Community Resilience initiatives operate from to draw conclusions about how likelihood of these new initiatives being able to meet the needs of contemporary residents.

4.0: Findings and Discussion: Intra-Community Variations in Storm Coping Abilities

The findings reveal that length of residence impacts upon residents' storm coping abilities, with long-term residence within a local area being associated with increased ability to cope during storm-related emergencies. None of the long-term residents reported negative, 'in crisis' descriptions in their personal experiences of recent severe weather events. In stark contrast, living in a local area for fewer than five years was associated with more negative experiences. Amongst those who had lived in the area for between 5 and 15 years, negative experiences were reported by some, however further examination of the data revealed that this

was reported only by those who had previously moved from an urban environment and/or who had worked outwith the village environment. Figure 2 shows the breakdown of results for each category within each of the case study sites in terms of the number of interviewees reporting either positive or negative experiences and coping abilities during recent storm events:

Total Number of Interviewees from all Case Study Sites N = 42																	
Case Study Site 1 N=13						Case Study Site 2 N=19						Case Study Site 3 N=10					
LoR 15 yrs>		LoR 5 - 15yrs		LoR 5< yrs		LoR 15 yrs >		LoR 5 - 15 yrs		LoR 5< yrs		LoR 15 yrs >		LoR 5 - 15 yrs		LoR 5 <yrs	
N=6		N=4		N=5		N=9		N=6		N=4		N=5		N=2		N=3	
Pos CA	Neg CA	Pos CA	Neg CA	Pos CA	Neg CA	Pos CA	Neg CA	Pos CA	Neg CA	Pos CA	Neg CA	Pos CA	Neg CA	Pos CA	Neg CA	Pos CA	Neg CA
N=6	N=0	N=3	N=1	N=0	N=3	N=8	N=1	N=2	N=4	N=1	N=3	N=5	N=0	N=1	N=1	N=0	N=3

Key

LoR = Length of Residential Duration within the Case Study Site
 Pos CA = Positive Description of Personal Ability to Cope During Recent Storm Events
 Neg CA = Negative Description of Personal Ability to Cope During Recent Storm Events
 N = Number of Interviewees

Figure 2: Figure showing total number of interviewees reporting positive or negative experiences and coping abilities during recent storm events for each residential category within each of the case study sites.

Long-standing opinions within the academic scholarship suggest that environmental ‘crisis events’ are socially constructed in terms of the degree of disruption that they bring (Oliver-Smith, 1999). All three storm events that affected the case study sites were officially defined by the Scottish Government as ‘crisis or red-alert emergency events’ (Official communication with emergency responder organisations, 2014). However, the interview responses suggest that not all residents viewed the same events to be representative of a crisis. The extent to which community members within each site were affected by the severe weather differed, with patterns of differences corresponding to length of duration of residence. Long-time residents did not emphasise 'exceptionality' or ‘severity’ when describing experiences. They also tended to deny that the storms posed significant disruption to their day-to-day lives or

hugely differed from their expectations of 'typical' Scottish winters. For example, one respondent from Arisaig stated:

'I wouldn't say it was exceptional.... It was a bad storm, I'll give you that, but, not terribleIt was bad for round here, but you get bad storms round here and some are worse than others.... It wasn't that much worse than normal'. (Resident, Arisaig, Interview, Dec 2014)

Responses from site 2 lend support to this, as one respondent stated: 'We've had storms before.....We just weren't as prepared for it this time round, but it's not a storm much different to any other. A storm is a storm....[W]orse things that can happen' (Resident, Lochranza, March 2015). Similarly, another displayed considerable self-confidence in his ability to cope with the 'snowmageddon' event, despite expressing a sense of resignation to being at the mercy of the weather, stating:

'There's nothing you can really do except sit it out and make sure those you know are okay. It just has to take its course; run its course, see. The electric, well if down, it's down and eventually they'll get it working again. Just takes time. It canna really be helped in these sorts of weather up here.....Aye, you just work round it and you get by. No real worries you see? Just a bit more care, aye.' (Long-time resident, Lochranza, March 2015).

Some interviewees even displayed an overt sense of pride in being able to cope successfully during severe storms, which corresponds to Parr and Philo's (2003) findings from the Highlands of Scotland that 'being resilient' and showing outsiders that one can cope during times of hardship is closely associated with perceptions of a local identity and one that is used to distinguish locals from non-locals. Expressions of pride in being able to demonstrate 'localism' through coping during storms were present in the statements of long-term residents at site 2, as exemplified below:

'Here we are resilient and we get on. We deal with things that others can't. People elsewhere see our way of doing things as inferior and their way of doing things as better. But with the storms we did things our way and it worked. We showed them what we can do. We showed them we don't need to rely on Westminster and be told what to do. We can manage on our own.' (Resident, Lochranza, April 2015).

In contrast, respondents who had arrived in the area fewer than five years before the onset of the storm event in question, tended to describe the event as ‘severe’ and ‘disruptive’ and gave detailed accounts of how the event significantly challenged their abilities to pursue their day-to-day life activities. One respondent from site 2 explained:

‘I don’t know how people can say its normal. It’s horrendous. You don’t know if your usual clubs are running...you think should I stock up on food or what will come next?...But we got no warning and then I panicked. You don’t know what you should do. And when it started, I thought it would go on forever. It was scary. I was scared. I never knew it could be so bad’
(Resident, Lochranza, April 2015).

This response, like the majority of others from the recent in-migrant group, reveals that the event in question resulted in a significant degree of what Edelstein (2004: 125-128, 136-142) refers to as ‘lifescape’ change or the production of ‘ontological insecurity’. While ontological insecurity is more commonly associated with technological-type disasters, such as oil spills, its presence has been noted in communities affected by natural disasters, extreme weather, civil war and political violence (Brewer, 2003; Carlin et al, 2014; Harries, 2008; Hawkins and Maurer, 2011; Rose et al, 2012), and also in indigenous communities where livelihoods have been suppressed by decades of colonial dominance (Samson, 2004). ‘Lifescape change’, produced in the context of environmental crises, consists of perceptions of a sense of isolation, abandonment, loss, distrust in others, distrust of the environment, and feelings of losing control over ones future destiny (Edelstein, 2004; Edelstein et al, 2007). According to Giddens (1991: 47), in order for an individual to be ontologically secure, they must ‘possess....answers to fundamental existential questions which all human life in some way addresses’. Ontological security can be threatened by a crisis because the chaos produced results in high levels of uncertainty that threatens the pursuit of individual life goals and leads to social displacement and disconnection from underlying beliefs and expectations about the way the world, society and community operates, which is exposed via critical questioning of deeply embedded, previously taken-for-granted assumptions (Giddens, 1991; Edelstein, 2004).

Recent in-migrant expressions of ontological insecurity indicates that the level of negative experiences reported following storm events is not dissimilar to the levels of distress induced by major internationally-reported disasters. This is exemplified in the following statement,

which reveals how a storm event led the respondent to reconsider her motivations about living in the area:

‘That winter, that made me think about why on earth I’d come up here in the first place. I know its drastic sounding, but....that really scared me. I didn’t think the weather could ever be that bad.....I thought I could have died and nobody would be any the wiser’. (Resident, Arisaig, December 2015).

Another respondent from site 2 echoed similar sentiments of ontological insecurity, describing feelings of abandonment and questions about the motivations of fellow residents:

‘I felt isolated. I didn’t get any information. In this day and age you think surely by now the governments have to do something, I don’t know, a national emergency or something to help people and not just leave them to it. You don’t think they’d just leave people to survive for themselves in those conditions nowadays but that’s what they did and I was shocked.....It was a very isolating experience not knowing what to do.....what’s more upsetting in a way is that nobody else came round either. That’s not what village life is supposed to be about. You’d think people would be more friendly and helpful but they weren’t. Sometimes they can be, but not when you need it the most and that’s most telling. I felt completely on my own and that was upsetting.’ (Resident, Lochranza, April 2015).

Similar sentiments were also evident amongst respondents in site 3:

‘I came here for that sense of community you’re supposed to get in rural areas...but those who aren’t from here don’t belong and they make you feel it. I noticed it badly with that storm.’ (Resident, Methlick, May 2015).

The largest variation in responses came from residents who had lived in the case study sites for between 5 and 15 years. Those who emphasised the ‘exceptionality’ of the weather and a lack of self-confidence in their ability to cope had all previously lived within a town or city, either in Scotland or elsewhere in the UK. They also tended to be employed outwith the village in a nearby town or city or retired from working in a city, rather than having been employed in locally-based rural occupations. They also claimed to have fewer or no informal social connections within the immediate local area, despite the fact that many belonged to local leisure clubs, stating that most of their friendships were with people living outwith the immediate area. The recollections of this sub-group also included descriptions of ontological insecurity, similar to those from the most recent in-migrant group. However, the recollections of those employed and whose social relationships were embedded within the local area did

not reflect these same ontologically insecure sentiments. This suggests that differences in coping abilities correspond to length of residence within a local area. Yet, as will be discussed in the following sections, these intra-community scale differences relate to differences in employment and leisure activities, friendship preferences and previous experience in adapting to storm events within the same area. Furthermore, differences in coping abilities does not only suggest that the impacts of storms are not experienced equally among residents, but that the experiences of in-migrants in communities regarded by Government and emergency response officials to be of ‘gold standard’ in terms of resilience, have not been fully acknowledged. This highlights the urgency for hazard mitigation developments to move beyond whole-scale approaches for safeguarding resident well-being in rural areas.

4.1: The Impact of Previous Storm Experiences on Recent Storm Coping Abilities

While a single event can be experienced differently throughout the same locality depending upon individuals’ length of residence within a community, employment history, lifestyle and social relationships, questions arise as to how these factors lead to notable differences in storm coping abilities. A wealth of scholarship that draws upon research conducted in various contexts across the world suggests a strong correlation is observable between previous experience of similar types of environmental disruptions and abilities to cope during crisis events which are more severe than the previous events witnessed (Edelstein 2004; Krupnik et al, 2010; Nuttall and Callaghan, 2000; Shaw and Goda 2004; Shaw et al, 2009). Evidence from the interviews with long-term residents lends support to this scholarship, revealing that previous experiences of severe weather events resulted in an increased ability to be practically prepared for future storms. Examples of being practically prepared included having a temporary heating source, keeping supplies of tinned food and torches in the house, and installing flood gates after having experienced severe flooding in the past. However, the evidence also suggests that the relationship between memories of previous events and coping ability is more complex than one of practical preparedness, with memories of previous events helping to prevent the onset of panic during storms. The interview responses build upon the previous scholarly findings regarding the relationship between memory and the enhancement of coping ability, as they suggest that recollections of earlier events draw the awareness of the observer to the unpredictability of the weather and the unique character of each single storm event, rather than functioning as a mere form of referential knowledge that prescriptively guides individuals through a new storm event. The long-term residents described memorable

storm events that had occurred within the local area during the course of their lifetimes and made comparisons between these and the recent storm events. These responses reveal that previous experience influences self-confidence during storms, as one elderly resident from site two commented:

‘I still remember the storms of [19]47, well more of a hard frost but tons of snow. I’m talking tons of the stuff. Then there was the one in [19]53 with the snow and then the winds when all the trees came down. The last one [March 2013], there was lots of snow... You do get a bit of odd weather here and there. It’s not that strange. Doesn’t worry me.’ (Resident, Case study site 2, October 2014).

This demonstrates that past events increase the coping capacity of community members in a more intimate and less prescriptive way than often implied by the existing body of scholarship. It suggests that past experiences mitigate vulnerability, not because they provide a set of prescriptive criteria that residents can directly compare a new event to, but because previous observation of the unpredictability of storms leads to more flexibility in resident expectations of the behaviour of a new storm. A similar sentiment was echoed in the statement of another resident, whose account indicates that while feelings of panic associated with environmental disasters are normally attributed to perceptions of a loss of control in terms of being able to understand, predict and affect the phenomenon being experienced, in the Scottish context they actually help to prevent panic because they reminded residents of the unpredictability and uncontrollability of the storms:

‘No two storms are alike.... With some you get more wind, sometimes more snow. You’ve just got to be prepared that it may happen and not worry. Sometimes it’s bad and the roads are blocked and other times it’s the cold that gets to you. You’ve just got to go with the flow and see what you get. You can’t think ‘this is bad because this isn’t happening like last year’... you take it for what it is not, the what ifs.’ (Resident, Arisaig, December 2014).

This suggests that feelings of security are produced through resignation to the unpredictability of the weather. This resignation, as opposed to searching for patterns or indicators of predictability, appears to be most significant for understanding how previous experiences enhance the coping capacities of the long-term residents. Further evidence of this relationship was reflected in long-term resident opinions about the development of local Resilience

Committees and official storm-response plans within all three sites. One resident stated that although the idea of community resilience sounded plausible in theory, he doubted that it could work successfully in practice. This was because these plans remove possible response actions from their actual, unique, real-life temporal contexts. Instead, they attempt to capture them within a formulaic, prescriptive and documented written plan that removes the flexibility of the many possible ways that an individual can choose to act during a particular moment in time:

‘You can’t be fully sure that that road won’t be blocked here and that so-and-so can get to check on so-and-so over there or that so-and-so won’t be ill that day and things like that. You don’t know what’s actually going to happen and if you are too fixed up with things like that, then others end up not checking up on people because they think so-and-so will do it because it says so on the list, so they think they will do it, but they can’t get there or something happens and nobody gets checked....If we just do it our way you can and work round each storm differently.’ (Resident, case study site 3, April 2015).

In contrast, the responses from those in the in-migrant group and those who migrated to their respective communities between 5 and 15 years ago revealed that vulnerability to storms can result from having limited experience of similar, previous events. Their accounts reflect a lack of preparedness for the storms, underestimations of the severity of the storms, and the onset of panic when the storms exceeded their expectations. Long-term resident opinions of the reasons why new residents tended to experience more difficulty in coping were associated with a lack of flexibility as well as a more general lack of adaptation skills, as one resident stated; ‘[T]hose coming from the cities miss out on something. They may have been told what to do, but they don’t have the skills. They’ve never needed to before’ (Resident, Arisaig, April 2015). Another explained that he believed that this would limit the potential for Community Resilience groups to succeed:

‘[T]he Government expects people to have this knowledge....but its common sense.... I’m not all that sure that can be taught. Families have it if they’ve been here and seen it all before. Others don’t. They might know in theory but it’s different when it’s really happening. They can’t learn it; you’ve got to see it. And then you can’t think I’ve seen *that* so I’ve got to do *that*. You sort of go I’ve seen that and that and that and this time I’ll do whatever is best at the time. You sort of pick and choose without thinking.’ (Resident, Arisaig, March 2015).

4.2: Links between Occupational Background and Differences in ways of Relating to the Environment in Influencing Adaptive Capacities to Storm Events

The interviews revealed that having an intimate knowledge of the physical geography of the surrounding rural landscape enhanced resident adaptive capacity during the storm events. Knowledge of the physical geography of one's immediate surroundings, gained through employment in local rural occupations, appeared to offer long-term residents a significant degree of protection against vulnerability. The interview accounts emphasised that familiarity with local surroundings helped residents to stay safe and orient themselves during the power blackouts that accompanied the storms. This familiarity also enabled them to make practical adjustments when moving about outdoors, with one resident stating that he was happy to walk about during the blackout because he was used to walking outdoors in the dark and always had to carry a torch when walking home from the village at night as the outskirts of the village are poorly lit, even in normal weather conditions. Others explained that knowledge of the physical environment was important for staying safe when driving during severe weather. Several respondents agreed that an absence of this form of knowledge led to snowplough drivers becoming trapped on several occasions, with one stating:

‘They come in to help but don’t know the area as well...It’s a long straight section and they get stuck because it’s always a drift area. You know you get stuck on straight open stretches round here. Then there’s the end of the backstreet here. That always floods deeply in the rain and after the snow, it’s the shape of it. You know not to drive through it.’ (Resident, Methlick, May 2015).

Others emphasised how knowledge of the physical surroundings was useful for assisting the official emergency response crews during the storms, especially as many response staff were brought in from other areas of Scotland and who sometimes had unrealistic ideas about the physical distance and challenges involved in travelling to remote locations. Long-term residents were able to assist incoming staff by giving advice on alternative access routes to remote houses, offering to help clear snow on smaller roads to enable continual access within the village, sharing their knowledge of which areas were most likely to flood during the melting of the snow, and advising as to which areas snow clearance efforts were likely to be limited by unfavourable combinations of drift and high winds.

In contrast, the responses of the recent in-migrants and those in the 5-15 year group who reported negative experiences implied that a lack of intimate knowledge of the nearby physical surroundings contributed to experiences of vulnerability. This was particularly evident in their descriptions of having become distressed at the length of time taken for power engineers to arrive in the area and their lack of awareness of the implications that distances and road conditions during severe weather would have on emergency service accessibility. Others described how they were afraid of going outdoors in the dark due to concerns about the risk of accidents or getting lost.

The responses from the 5-15 year category varied. The statements of those who did not report negative experiences during the extreme weather, revealed a strong correlation between levels of embeddedness within the physical geography of the area and adaptive capacity during storms. Furthermore, of those from this category who demonstrated self-confidence in adapting to extreme weather, all but one was currently or had previously been employed in the agriculture, fishing, forestry and other locally-based industry or had a family member nearby who was employed in one of these sectors. This suggests that employment activity features in the acquisition of this form of knowledge and skill. In addition, the majority of this group reported that they regularly took part in locally-based leisure and recreational activities that took place on the land, such as clay pigeon shooting and hiking. However, with over half of the respondents reporting negative experiences also reporting taking part in hiking and other outdoor leisure activities, this suggests that employment in the agriculture, forestry or fishing industries fosters deeper connections to the physical intricacies of local environments than can be achieved through leisure activities alone. In contrast, none of the most recent in-migrants were or had been employed in these local industries.

The interview accounts therefore suggest that land-based occupations that involve working *with* the land and its resources are more effective in generating environmental awareness than leisure activities that take place *on* the land. This corresponds to the findings of Senior (2016), who draws upon Ingold's (2007) phenomenological approach to describe how awareness of the wind is fostered through sensory engagement with it, obtained from attending to it in the course of day-to-day life. Describing how gardeners in the north of Scotland learn to shield plants from the weather, she explains that they learn to attune themselves with the power and agency of the wind, over a long period of time (Senior, 2016: 3-7). As a result of this attunement, the gardeners gradually learn and develop effective ways of shielding their plants

(ibid). For those experienced in coping with the wind, the wind becomes viewed as ‘something that blows’, rather than an object or an entity that blows (ibid). According to Ingold (2007: 521), ‘to feel the wind is not to make external, tactile contact with our surroundings but to mingle with them’. If an intimate knowledge of the environment can be obtained through engagement with one’s surroundings through working with its resources over time (Ingold 2007, 2000), it follows that occupational activities that involve paying attention to the weather and landscape, such as in the agricultural industry, will result in deeper connections to the environment and deeper understandings of place-based weather phenomena. In contrast, leisure activities, such as hiking, which involve moving *on* the land but not learning to work in attunement *with* the land are therefore less likely to foster the same degree of environmental awareness. But, while deeper knowledge of the landscape helps to safeguard long-term residents against storm-related vulnerability, the question remains as to how recent in-migrants can access this deeper form of knowledge to be able to cope more effectively during future storm events.

4.3: Intra-community social relations: Are all social relationships equal in their capacity to mitigate vulnerability during storms?

The existing body of scholarship exploring human responses to environmental hazards suggests that greater levels of community cohesion enable residents to plan for, mitigate and recover from natural disasters and weather-related events (Edelstein, 2000). However, the interview evidence suggests that at the intra-community scale, the relationship between community cohesion and adaptive capacity is more positive for long-term residents and for those in the 5 -15 year category who did not report negative experiences during the storms, than it is for more recent in-migrants. This implies that not all locally-situated social activity influences adaptive capacity on an equal basis. Furthermore, the evidence suggests an absence of *bonding* social capital, defined as networks between homogenous social groupings that enable them to band together to support collective needs (Putnam, 2000), is not only absent at the whole-community level, but also absent within the more loosely connected in-migrant social groups when compared to the groups of long-term residents. In addition, a lack of *bridging* social capital, defined as networks between socially heterogeneous groups (Putnam, 2000), is observable between long-term residents and in-migrants. This suggests that current Government efforts to foster the transmission of adaptive knowledge between community groups are likely to be limited in terms of success.

The accounts of those in the long-term category reveal that employment contacts, informal-connections and friendships proved to be significant for preventing vulnerability during the storms. Local socio-cultural norms in rural Scotland result in many people associating personal independence with self-worth. This means that they are often reluctant to ask for help and dislike being directly offered help from official organisations or those outwith immediate family, friendship and neighbourly circles. One interviewee explained that because of this reluctance to ask for help, neighbours and friends are expected to notice rather than be directly told if someone is experiencing difficulty. In addition, they also need to provide assistance in a ‘very subtle’, informal way, ‘that is more like doing a favour for a friend or more like being a neighbour than actually offering help directly.’ This culturally-embedded informal manner of conducting social relations can help to mitigate the negative effects of storms as long-term residents are experienced in spotting hidden vulnerabilities through observation. This is especially important as elderly people are often much more reluctant than others to share personal details with those from official organisations, as explained by a respondent:

‘In this area it was never the done thing to ask an outsider or official for help. That’s how it’s always been. It was a sign of weakness to get somebody in and officials coming in to help was seen as interfering. I think people today still have this idea that it’s bad to ask outsiders for help. They learnt from their parents that it’s nobody else’s business. I knew about X who couldn’t eat, only liquidised food and she couldn’t carry things. Small things you learn from being a neighbour, but she wouldn’t tell me when she became ill. She wouldn’t have told me if she needed help in the storm. But you could see whether she looked cold.’ (Resident, case study site 3, May 2015).

However, long-term residents in all three sites recognised that social cohesion at the whole community scale was much more fragmented during the recent storms than it had previously been. Some expressed concern that demographic change and the expansion of villages led to problems identifying those who may need help, as well as creating new challenges for providing practical assistance. One respondent described how an elderly resident with chronic health and mobility difficulties was left on her own because people were not checking up on each other during the storms to the extent that they had previously done several decades ago. Her account revealed how the informal neighbourly friendship connections of the past

provided more protection than contemporary friendship networks, which tend to be linked to membership of more formally-organised social and leisure activity groups:

‘It’s not just help people need, there’s an emotional side. It’s supposed to be strong community but nobody checked on her. There’s less of that sort of infrastructure, that informal unwritten guarantee. The younger ones moving in are less involved here. They set up and join clubs here and there but stick together round the things they do. They don’t seem to care as much for the community in the wider sort of way like the rest.’ (Resident, Arisaig, March 2015).

This lack of social bonding between resident social groups affected coping abilities during the storms, with long-term residents stating that the social groups of incoming residents did not have a formal or informal support network to assist each other and like they did. Long-term residents were often unable to assist more recent in-migrants, as they did not have the personal familiarity with these residents like they had amongst those within their own social networks. This implies that a lack of bridging capacity exists between the different social groups at the whole community level, which prevents the establishment of a successful support system at the village scale. Residents said that during the recent storms they were reluctant to knock on the doors of people they did not know to check if they were coping, because incoming residents are often particularly conscious of their privacy. In addition, being less acclimatised to rural life, they also tend to be more suspicious when someone they do not know well appears unannounced at their door. While the ethnographic and interview evidence suggests that, despite their general dislike of unplanned visitors, many recent in-migrants would have appreciated the offer of assistance during the storms, the reluctance of long-term residents to offer assistance reflects the presence of a particularly poignant paradoxical situation. Deeply-embedded socio-cultural beliefs that it can be perceived to be insulting to directly offer assistance to someone outwith immediate circles and awareness that what they consider to be a ‘neighbourly visit’ under normal circumstances can be viewed as uninvited nosiness by incoming residents, creates a particularly difficult dilemma for long-term residents to overcome when attempting to interact with other groups during storm situations.

The responses of recent in-migrants revealed an absence of social connectedness within the community setting. Their responses also suggested that the absence of social bonding had a negative effect on storm coping ability. Members of this group reported that they did not

know who to turn to for help during the storms. Their recollections of the storms included descriptions of heightened perceptions of loneliness, isolation and abandonment and revealed that the majority had very few or no social relationships with other members of the community. Those who had friends within the area, tended to have formed these friendships with other in-migrants whom they had met through sports clubs or through their children's school. The majority reported that their closest friendships were with people who lived elsewhere. This meant that when the telephone and internet were unavailable during the storms, they were unable to contact their friends and relatives to ask for advice or to receive emotional support. Many also believed that, even if they had been able to contact them, the amount of practical support that friend's outwith the area could have provided would have been limited due to unfamiliarity with the area. Turning to immediate neighbours also proved difficult because recent in-migrants tend to live in either the new-built settlements where their neighbours are also in-migrants or in more remote detached houses or converted steadings. Others stated that they would not have felt comfortable turning to another person who is a 'neighbour' rather than a 'friend' for emotional support. Those whose neighbours were also recent in-migrants believed that their neighbours were unlikely to have the necessary knowledge or experience to cope as successfully as the long-term residents.

The responses of residents who had lived in their respective areas for between 5 and 15 years, suggested that those who reported more positive experiences in adapting to the storms, believed that they were supported by their social connections. They were also able to help out with practical matters by drawing on their knowledge of the local 'informal' social networks that they had gained from employment and recreational activities within the local area. This group also reported greater levels of socio-cultural awareness of how to offer support in ways that did not offend. For this group, the presence of social connections helped to protect against vulnerability, both in practical and emotional terms, in the same way as for the long-term residents. However, for those from the 5 -15 year category who reported negative experiences during the storms, it can be argued that it is not so much a lack of local social contacts that increased vulnerability, but rather that the level of influence that these contacts had for enabling successful adaptation. The locally-based friendships of this group, tended to be with other incomers rather than long-term residents. Comments were made that very little social interaction takes place between themselves and long-term residents, or with those who have resided in the village for the same length of time but who are locally employed. This meant that during the storms the capacity of the social contacts of this group to prevent

vulnerability was as limited as it was for the recent in-migrant group. While many said they felt confident that long-term residents could provide practical support during the storms, they also expressed reluctance to ask for help due to concerns about how they, as outsiders, would be viewed by the long-term residents:

‘It’s the fear of being thought stupid that makes me not want to ask. They will think ‘typical city person’... Then they’ll think less of me and probably attribute this to other incomers too. I don’t want to be one who makes it all worse for everyone else.’ (Resident, location withheld to protect identity, 2015)

This suggests that the relationship between social cohesion and successful storm adaptation is dependent upon the extent to which it fosters bonding with long-term residents. Moreover, even if long-term residents possess the practical knowledge to mitigate vulnerability during storms, the lack of social bonding and bridging capital amongst in-migrants and at the whole community level creates barriers to preventing in-migrant vulnerability and the creation of knowledge transmission opportunities to enable better preparation for future storms.

5.0: Significance of Findings for Scottish Community Resilience Initiatives and for Developments in the Policy and Practice of Disaster Risk Reduction

The evidence reveals that length of residence within a particular location corresponds to differences in abilities to cope during storm events, with long-term residence being associated with confidence in adaptive ability and an absence of major lifescape change. Recent in-migration is associated with lifescape change, including at levels on a par with communities affected by major industrial accidents or natural disasters. Differences in outcomes between long-term residents and recent in-migrants correspond to differences in exposure to previous severe weather events, differences in employment and leisure activities that generate differences in ways of relating to the land, and differences in social networks and expectations. In-migrant groups become particularly disadvantaged in responding during storms because their capacities to self-organise are more limited than for long-term residents. In addition, a lack of bridging social capital between in-migrant social groups and the groups of long-term residents limits the capacity of long-term residents involved in establishing and carrying out local Community Resilience plans to include the perspectives of in-migrants and to respond effectively to their needs.

This presents an important consideration for policy developments within the Disaster Risk Reduction context. Variation in resident storm coping ability at the intra-community scale reveals the presence of a significant inconsistency between the operationalisation of Scottish Community Resilience initiatives and the scales in which local livelihoods and extreme weather responses play out. The Scottish Government's approach to defining rural areas on the basis of population size and geographic location and its implementation of the Community Resilience initiative at the whole-village scale can be said to reflect inaccurate, oversimplified and outdated assumptions about rural demographics, socio-cultural homogeneity and community cohesiveness. In this particular case, whole community-scale approaches to hazard mitigation can be argued to risk imposing an artificial operational framework that, in effect, potentially reduces its likelihood of being successful in enhancing the capacity of community members to be able to adapt to the impacts of extreme weather events without the support of the emergency services.

The ontological insecurity experienced by recent in-migrants and the lack of official appreciation for intra-community variation also raises a second major point for scholarly and policy consideration. The experiences of the recent in-migrants reveal the significance that the growth of rural populations has had in enhancing the risks to human well-being faced by rural dwellers during extreme weather events. While the Scottish Government currently defines individual vulnerability to severe weather events on the basis of a person's age, disability status and medical needs and assesses the vulnerability of a geographic area according to the numbers of people who can be deemed to be at risk because of age, disability or medical conditions (Scottish Government, 2014), the study findings suggest that length of residence should also feature in official classifications of vulnerability to extreme weather. As the numbers of residents officially identified as vulnerable within a particular location determines the allocation of emergency service support offered during extreme weather events, it follows that including recent in-migration as marker of increased risk of vulnerability could enable rural areas with high numbers of in-migrants to be allocated greater support to prevent greater risks of harm during storm events. Given that the rural population of Scotland, as well as the numbers, frequency and severity of extreme weather events, are predicted to increase over the next few decades (Scottish Government, 2011; 2014), this is a consideration worthy of further exploration.

However, although recent in-migrants generally favour greater emergency service support as being the most effective solution for combating risk during storm events, this suggestion places greater demands on financially-stretched emergency services. While formal Community Resilience initiatives are more likely to be able to meet the needs of in-migrant residents than completely uncoordinated local efforts, the degree of involvement that long-term residents are being expected to take to establish and operationalise these plans can be said to place an unfair burden of responsibility upon this group of residents. Indeed, the developments can already be seen to be increasing tensions between long-term and recent in-migrant residents. While the most recent in-migrant group tend to express considerable eagerness towards the establishment of these schemes, they also argue that they should be carefully monitored by Government bodies to ensure that their needs are not subsumed by the voices of long-term residents, whom they believe want to rely less on officially-implemented systems. However, given the lack of bridging capital between long-term residents and in-migrants, opportunities for bringing the groups together to draw up plans to coordinate future responses remain limited. Furthermore, as the recent in-migrant groups do not possess the same degree of social bonding capital within their own groups in comparison to the groups of long-term residents and also lack bonds with the groups of long-term residents, they are more likely to lack the knowledge of the wider social environment necessary to be able to participate in carrying out a response plan even if willing to do so.

The study also raises concern about the Government's current approach to rolling out and assessing satisfaction with the plans by means of communication with one volunteer or one Community Council representative within each village who are already known to Local Authority and Government officials. The extent to which plans can be communicated across an entire rural location and also include in-migrant concerns in their feedback are limited, owing to the lack of social bonds between representatives and groups of in-migrants. Furthermore, given that social relationships appear to be increasingly diversifying, with different social groups turning inwards rather than outwards towards the overarching whole community, opportunities for people within a community to come together during periods of normalcy to develop the social bonds that would enable Community Resilience initiatives to operate successfully are also increasingly waning. Therefore, unless the initiatives are adapted to account for the needs of the diverse sub-communities that operate within each village, their ability to generate co-dependency between the different social groups by providing spaces for knowledge transmission are likely to fall short of expectation.

Nevertheless, bringing residents together under the umbrella of a common purpose of enhancing a community's resilience to extreme weather by holding meetings to transmit practical advice about where to obtain emergency supplies and assistance during future storms may prove to be useful for helping to mitigate the risk of harm, at least to a small extent. Deploying a member of the official emergency services to set up Community Resilience plans and to arrange opportunities for members of the community to provide feedback may be a suitable alternative to asking a community representative to carry out these tasks and one that may help to include the perspectives of recent in-migrants.

On the other hand, the overall extent to which the adoption of formal community resilience plans are likely to prove successful for enabling in-migrant populations to cope during storm events is also likely to remain limited because the forms of knowledge that are most significant for adaptation are difficult to capture in written, propositional form. Being skilled in adapting to storm events in the rural Scottish context consists of more than simply being able to take practical steps to mitigate harm. Instead, being able to cope involves deeper awareness and understanding of weather and local environments, ground upon long-term observation and experience. It is these observations of weather are most significant for enabling residents to take appropriate action to safeguard their own well-being and the well-being of others. It is therefore doubtful that the extractive approach to weather-related knowledge that Community Resilience plans deploy could prove to be fully successful in enabling those without this deeply embedded knowledge to cope. Furthermore, decontextualising local customary ways of interacting with neighbours by implementing an official structure about how these relations should be conducted also risks undermining the spontaneous decision-making that long-term residents undertake to successfully respond to emerging threats during storm events.

This reveals a need for further research into how adaptive knowledge can be more effectively transmitted in the rural Scottish context, as well as to how increasing community diversity can be built into Community Resilience developments to improve existing shortcomings. Possibilities as to how to respond to increasing intra-community division may include abandoning the single-scale approach to rural settings in favour of adopting the 'communities-within-community' approach to resilience in Disaster Risk Reduction that is often used in urban contexts. According to this approach, resilience to adversity can be demonstrated in

complex societies if all connecting elements or factions within the overall community can each absorb and recover from stresses associated with climate variability on an individual basis (Berkes and Ross, 2012; Folke et al, 2002; Hidalgo and Hernandez, 2001; Magis, 2010; Miles, 2015; Pavlich, 2001; Scannell and Gifford, 2010). However, in order for this to occur, each intra-community group within the overall structure needs to be able to organise itself and its resources prior to and during emergencies. This approach also depends on the ability of all interconnecting parts to mobilise on an equal basis (Berkes, 2007; Folke et al, 2010; Norris et al, 2008; Paton and Johnston, 2001). However, scholars have already noted that a lack of social interconnectedness between different groups means that this more defragmented approach is also likely to fall short of expectation (Boruff and Cutter, 2007; Cutter et al, 2010; Gabutt et al, 2015; Lauer, 2014; 2016; Meerow et al, 2016; Otto-Zimmermann, 2011; Pelling et al, 2011).

The findings from the study suggesting that local employment in the land-based industries offers protection against vulnerability during severe weather events, corresponds to Ingold's (2007; 2011) phenomenological theory of knowledge and the findings of Senior's (2016), which stress that skill in coping with weather-related change is acquired over long periods of time spent immersed within local environments. While Ingold's theory has not yet been applied within the Disaster Risk Reduction context, it suggests that the knowledge and skills that are most significant for learning how to adapt to climate disruption are acquired through long-term awareness obtained through direct engagement with one's environment. This hints towards longer-term solutions to the risks posed by extreme weather being more likely to be found via the promotion of the long-term involvement of rural residents in land-based community activities, such as via maintaining woodland trails or community gardens, rather than through resident involvement in Community Resilience planning initiatives.

6.0: Conclusion

This paper presents a unique case study that explores how increasing demographic and socio-cultural diversity within contemporary rural communities affects the ability of residents to cope during extreme weather events. The evidence presented suggests that differences in abilities between long-term residents and more recent in-migrants to successfully adapt during storm events relates to differences in degree of exposure to previous hazardous weather

events, occupational backgrounds and differences in patterns of social relationships and expectations.

The study presents an original contribution to the rural studies scholarship by highlighting the impacts of rural in-migration in influencing residents' abilities to cope during extreme weather events. The findings call for greater policy appreciation of how differences in social environments, employment backgrounds and exposure to previous storm events affects the capacities of different groups of residents to be able to adapt to climate change phenomena. Moreover, the findings stress the need for greater consideration to be given at the intra-community scale in developments for Disaster Risk Reduction in contemporary rural settings. The study recognises the significance that increasing socio-culturally heterogeneity has had upon social networking abilities and reveals how this affects the potential for community-based hazard mitigation developments to be met with success.

Policy developments underpinned by conceptualisations of rural places according to geographic location are unlikely to be equally responsive to the needs of all residents in an increasingly diverse rural society. The study emphasises that the Scottish Government's mobilisation of Community Resilience initiatives at the whole-community scale reflects inaccurate, oversimplified and outdated assumptions of demographic and socio-cultural homogeneity. One important policy recommendation that can be made on the basis of the findings is for this initiative to be implemented at the intra-community scale in order to help ensure that the increasing diversity of rural communities is more readily acknowledged and addressed. In addition, the extent to which rural in-migrants can experience ontological insecurity following exposure to extreme weather also suggests that new arrivals should perhaps be allocated greater priority by Government officials when distributing emergency service support. Or, at the very least, their numbers should be considered when assessing the overall vulnerability of an area. The inclusion of recent in-migration as a marker of individual vulnerability to hazardous weather events in official Government 'persons at risk' databases is another recommendation worthy of further consideration.

The considerations raised within the Scottish context are applicable to other rural areas where the population of rural residents is expected to increase over the coming decades. The study also reveals a need for enhancing the scholarly attention given to inequalities present in community members' experiences of environmental hazard events, which are still often

remain absent from the bulk of scholarly accounts, especially within those that focus on small-scale communities. Intra-community scale perspectives can avoid further disempowering those most marginalised within small communities, as they avoid subsuming differences in perspectives within a single overarching perspective. Finally, if long-term engagement with local environments offers protection against the risks to human well-being posed by severe weather, it suggests that a more effective long-term solution for reducing weather-related vulnerability in an increasingly diverse rural society may be to increase resident involvement in land-based community activities rather than in response planning activities alone. This raises exciting opportunities and possibilities for future research within this area.

Acknowledgements:

The research was conducted at the University of Dundee as part of a Knowledge Transfer Partnership project examining responses to prolonged power outages in extreme weather events in the UK. The project was funded by The Scottish Government and Innovate UK, and carried out in partnership with Scottish and Southern Energy Power Distribution (KTP Project Grant Number 9415). I am grateful to all those who participated in the project and especially to my two postdoctoral research supervisors, Dr Edward Hall and Professor Thilo Kroll. I also express my thanks to the anonymous reviewers for their comments on the drafts of this paper.

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