Understanding local disaster culture to build resilience

The case of the historic centres of York and Amatrice

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Abstract

In the midst of sudden and dramatic environmental changes, ‘resilience thinking’ has become a leading approach. It underlines the adaptive capacity of a system to drive transformations and to deal with uncertainty. Yet, within the discipline of heritage conservation, the practical applications of the concept of resilience are underdeveloped, lacking methods to integrate it in the management of cultural heritage exposed to natural hazards. This thesis undertakes a comparative analysis of two historic centres: York (UK), affected by the 2015 flood, and Amatrice (IT), severely damaged by a series of earthquakes in 2016. From this, it is argued that resilience lies more broadly in the community's knowledge, awareness and perception of risk; in other words, in its ‘local disaster culture’. This concept is used throughout this thesis to emphasise the interdependent relationship between resilience and local communities, including the values and traditions that shape the historic environment. The use of GIS software in a participatory way (PGIS) is explored in two different contexts to define the multi dimensions of resilience, drawing on the existing knowledge and memories of the community. The development of thematic and interactive maps, which integrate both technical and subjective layers of knowledge, provide a holistic representation of resilience by both engaging and increasing community awareness. Thus, in this thesis, participatory mapping is used to integrate the tangible and intangible aspects of the local disaster culture with heritage values to guide future adaptations within the recovery process. From the results of the participatory activities, the concept of resilience emerged as contextual and connected to the local community’s culture and values. Therefore, resilience is the product of different levels of meanings connected to different stakeholders' personal and collective experiences. The experience in two different and significant historic centres provides a model able to inform heritage practitioners in long-term decision-making for historic building reconstruction and adaptation, embedding the local community’s perspectives and voices.

“Change is ongoing. Everything changes in some way – size, position, composition, frequency, velocity, thinking, whatever. Every living thing, every bit of matter, all the energy of the universe changes in some way. I don’t claim that everything changes in every way, but everything changes in some way.”

(Butler 1993, 204)

List of Contents

List of Tables

List of Figures

List of Accompanying Material

The following digital material is included with this volume:

- GIS York Excel spreadsheet:

1. Mapping the resilience of York_Questionnaire responses
2. GIS data York
3. York_GIS resilient assessment
4. York_GIS vulnerability assessment

- GIS Amatrice Excel spreadsheet:

1. Mapping the resilience of Amatrice_Questionnaire responses
2. GIS data Amatrice
3. GIS Mapping value Amatrice

- PGR COVID-19 IMPACT STATEMENT

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Author's Declaration

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, university. All sources are acknowledged as references.

Examiners should note that the following Conference paper has been published during this research:

- Chitty, G. and Sprega, A. (2018) 'The use of WebGIS to enhance community resilience to flooding: Discovering the tangible and intangible local flood culture of the city of York.', in. *ICOMOS 19th General Assembly and Scientific Symposium 'Heritage and Democracy'*, 13-14th December 2017, New Delhi, India.

1. Introduction to Heritage and Resilience

Change is everywhere. In recent decades, conservation theories and approaches have evolved to embrace change in the management of heritage assets. In this context, the concept of resilience has become increasingly influential, offering a powerful framework to develop new conservation strategies. This thesis contributes to the understanding of 'resilience thinking' in relation to how heritage assets adapt and transform after the impact of extreme natural events such as flooding and earthquakes. By comparing the disaster-recovery processes of two European historic centres, York (UK) and Amatrice (Italy), the multifaceted meaning of resilience is unfolded, and entwined with the dynamic relationship between communities and their cultural heritage. The multidisciplinary nature of this research brings together environmental studies, engineering approaches, and social sciences; each with a focus on architecture and conservation. In doing so, it highlights the profound interdependency of built cultural heritage and its social-ecological system, which is intended as the link between people and nature. Central to this is how resilience thinking is applied in at risk areas, and how tangible and intangible resilient practices shape the heritage of selected communities. Acknowledging the need to clarify the interrelation between people and their heritage with regard to risk management, the project has utilised participatory and mixed methods of analysis to build an understanding of the resilience of the two historic centres. The Participatory Geographic System (PGIS) has been employed both in the phases of data analysis and in the dissemination of the results. The results have been shared with the study participants and with the wider academic community through national and international conferences. Therefore, participatory methods constitute the core of the research both as a means of public engagement and as a way of balancing the fragile relationship between local knowledge and

technocratic approaches. Within this research, there is an ambition to document examples of resilience practices and how they shape the built environment and behavioural practices of communities. It is argued that these resilience practices are rooted in the 'local disaster culture' of a place, which encompasses all the tangible and intangible elements that have historically been developed to address external risks (see sections 2.1-2.2 for a discussion of this notion).

This chapter first outlines the research scope by establishing a connection between disaster, climate change, and the tangible and intangible expressions of culture. Firstly, the concept of disasters is explored by providing a historical *excursus* of the development of its meaning. Thereafter, the impact of climate change is described in relation to resilience and sustainable practices within the cultural heritage field. This relationship foregrounds the research questions and motivations that led to analysing two case studies. The justification for this choice is here fully explained. Finally, the chapter's structure summarises the theoretical arguments that thread through the subsequent chapters. Overall, this chapter introduces the key topics of resilience, culture and risk alongside heritage theories and practices that will be further developed in the following chapters.

1.1 Multiple meanings of disaster

Natural disasters have significantly impacted the history of humankind, influencing our traditions and customs and shaping our collective memory. Historic representation of natural disasters often depicted human beings' impotence in the face of the force of nature driven by Divine punishment. Interpreting the most famous paintings representing floods such as The Deluge Drawings (Leonardo da Vinci, 1517-8), The Great Wave (Hokusai, 1829-32), or earthquakes such as the fresco representing the destruction of Cusco in the great earthquake of 1650, (Alonso Cortes Monroy), a recurrent theme is the apocalyptic composition of the images and the destructive power of nature that leaves humanity, landscapes and cities defenceless.

Throughout the centuries, this perception prevailed in the ways people responded and interpreted environmental disasters, finding the only cause of their misery and affliction to be supernatural forces. Indeed, the term ‘disaster’ derives from the Latin word *astrum* with the prefix *dis*, which means unfavourable star constellation. In the Middle Ages in Italy, the term was used to indicate a moral warning or punishment from God in the form of, for example, earthquakes or floods (Schenk 2015, 76). While the association between cultural beliefs and disaster's effects is less evident in contemporary societies, it is still possible to identify distinct cultural responses to natural disaster events such as flooding or earthquake. For example, the World Disasters Report (Cannon and International Federation of Red Cross and Red Crescent Societies 2014, 11) pointed out that in recent natural disaster events such as the 2011 earthquake and the resulting tsunami in Japan, Hurricane Katrina in the United States in 2005, and the 2012 eruption of the Mount Cameroon volcano in West Africa, some groups of people affected still believed it was God's punishment for sinful behaviour.

However, since the 1980s, with the first Gaia conference (1985), scientific advances in the environmental field have highlighted the connection between climate change and increasing numbers of extreme natural events. The United Nations established the Intergovernmental Panel on Climate Change (IPCC) in 1988 to analyse the socio-economic impacts of global warming. The Fifth Assessment Report confirmed that anthropogenic activities are clearly linked to climate change (Stocker et al. 2013). The growing acceptance of scientific explanations for extreme environmental events has gradually shifted the role of communities from ‘victims’ of disasters to a more active role in adopting behaviours that can mitigate the damage caused by natural hazards. Understanding the changing definitions of disasters and their impact on communities' perception has a strong implication for the ways society deals with them. In his seminal book, Quarantelli encouraged an international debate by asking "What is a disaster?" (Quarantelli 1998). Collecting contributions from diverse fields, Quarantelli provides alternative perspectives to the leading techno-

centric paradigm that characterized 20th century politics and theories. The interdisciplinary studies presented reflective approaches which emphasise the shift from understanding a disaster as an 'Act of Nature' to an 'Act of Women and Men' (Furedi 2007, 483).

The advances in sociological studies (Cannon 1994) have contributed to the acceptance that 'natural disasters' is a misleading concept, introducing a novel theoretical framework that defines a disaster as the manifestation of social vulnerabilities. Other scholars (Cuny and Abrams 1983; Lewis 1999) highlight the relationship between disasters and development, suggesting that the underlying vulnerabilities of a specific community such as poverty and a lack of resources are a catalyst for the potential of a disaster. Accordingly, Jigyasu (2002) acknowledges the social, environmental and developmental issues as an alternative to the 'techno-centric paradigm'. However, he points out the importance of the cultural dimension in analysing the development conditions both before and after phases of a disaster. This is intended to plan for mitigation and effectiveness of relief and emergency operations (Jigyasu 2002, 41). Oliver-Smith (1999, 28-29) frames disaster as a product of the relationship between society, environment, and culture from an anthropological perspective. Central to this is the adaptive predisposition of a social system to its environmental context and, therefore, the hazard risk. This adaptive capacity is strongly connected with the concept of resilience proposed by Holling (1973) (see section 2.6 for further discussion of the term) who define it as the capacity of a system "to absorb changes of state variables, driving variables, and parameters, and still persist" (Holling 1973, 18). Although Holling does not refer directly to the term *disaster* he considers the 'external disturbances' as an integral part of the manmade-environment in which the concept of resilience is included.

After exploring the definition of the term 'disaster' in different disciplines, it is possible to identify corresponding approaches to mitigate its impacts. A significant advance into this discipline is marked by Jigyasu's contribution (2005, 51), where he reflects on the 'reality' of a disaster. He notes that the technocratic approaches

to disasters refer to them as an objective reality confined in a specific time and space. Adopting an ‘eastern philosophy’, Jigyasu (2005a) considers the disaster beyond its physical manifestation or ‘reality’ as it is rooted deeper in the human consciousness, in other words, its perceptions and experiences. The acceptance of a disaster, and learning to live with the risk, lead a community to move from passive recipients to proactive participants. This holistic understanding of disasters aligns with the introduction of ‘resilience thinking’ (see section 2.6 for the discussion of this concept) into heritage studies. Resilience thinking is a theoretical approach that uses the concepts of ‘adaptability’ and ‘transformability’ to confer an active role to the socio-ecological system, including how people combine sources of experience and knowledge to overcome crises (Folke et al. 2010). While most of the disaster paradigms previously described are focused on the weakness or vulnerability of a system, the ecological perspective introduces a proactive component in terms of adaptation which refers to the concept of resilience. This paradigm shift will be broadly discussed in chapter 2. Despite the importance and validity of the different theoretical frameworks relating to the disaster, in my study, I am adopting a resilience perspective considering the multiple realities of a disaster in terms of its physical manifestation and human experience. Thus, resilience in relation to disaster is considered connected to the local context, the community's adaptive capacity and the historic buildings, including tangible and intangible components. This distinction between tangible and intangible aspects of local disaster culture is utilised throughout the research where 'intangible' aspects include cultural practices and human behaviours. The dichotomy of the two concepts also reflects the distinction between structural and non-structural measures of coping with disasters. These measures are defined by the United Nations Office for Disaster Risk Reduction (UNDRR) as physical constructions (structural), knowledge and practices (non-structural) used to reduce the impact of hazards. The inclusion of the intangible and non-structural dimension of coping with the external risk aligns with the holistic resilience approach in hazards research, challenging the pervasive technocratic language that privileges only tangible elements of disaster response.

1.2 Climate change and heritage conservation: the role of resilience

In this section the relationship between heritage and the impacts of climate changes is outlined by emphasising the role of resilience. Cultural heritage is increasingly threatened by the impacts of climate change and natural hazards. The significant material loss or damage incurred after a flood or earthquake affects a specific place in terms of socio-economic factors and impacts cultural diversity and inheritance globally. This issue is also evident in post-war conservation practice, which is shaped by the philosophy adopted by the Venice Charter (1964) and its predecessors, affirming that:

> People are becoming more and more conscious of the unity of human values and regard ancient monuments as a common heritage. The common responsibility to safeguard them for future generations is recognised. It is our duty to hand them on in the full richness of their authenticity.
>
> (ICOMOS 1964)

After adopting the Venice Charter, the conservation of cultural heritage has faced significant changes that will be elucidated in chapter 3. From the cultural heritage perspective on climate change, the 'Convention concerning the protection of the world cultural and natural heritage' adopted by UNESCO in 1972, "recognises the way in which people interact with nature, and the fundamental need to preserve the balance between the two". This new awareness highlights the relationship between cultural and natural heritage, promoting a joint effort for its worldwide protection against the risks caused by a global society and indiscriminate economic development (UNESCO 2005). International cultural organizations, such as ICOMOS, recently responded to the climate crisis in 2017, elaborating new policies such as the "Resolution 19GA 2017/30" (ICOMOS 2017). The document recognises for the first time the Paris Agreement and "committing the organisation to mobilise the cultural heritage community for climate action". This led to a modern

understanding of cultural heritage as a catalyst to mitigate the effects of climate change by its dynamic adaptation . Indeed, cultural assets which are increasingly exposed to shifting weather patterns and extreme events need more flexible and adaptive interventions to be able to respond to adverse and sudden environmental changes. These measures include both monitoring and maintenance as well as structural interventions to improve the performance of a building during natural hazards.

Central to this was firstly the adoption of the Nara Document on Authenticity (ICOMOS 1994) which embraces the relativism of notions of authenticity to broaden the understanding of cultural heritage including different values. Significantly the Burra Charter (2013), adopted for the first time in 1979, introduces the concept of place, emphasising less tangible aspects of cultural significance (Australia ICOMOS 2013). The changing focus from a materialistic approach to heritage to more value-based management has promoted innovation in conservation approaches that transcend the heritage professional's individual expertise. This change has led to a greater emphasis on community involvement and participation, which prioritises their perspectives and values and action in the management and conservation of cultural heritage. The FARO Convention on the Value of Cultural Heritage for Society underlines the importance of public participation:

> Cultural heritage protection as a central factor in the mutually supporting objectives of sustainable development, cultural diversity and contemporary creativity recognising the public interest associated with elements of the cultural heritage in accordance with their importance to society.
>
> (Council of Europe 2005, art. 5)

The concept of sustainable development, articulated in the above article, has gradually evolved since the 1970s. From the heritage conservation perspective, Matero (2003) refers to sustainability in terms of a dynamic process involving public

participation and thoughtful management of change responsive to the historic environment. Based on this international effort, the UNESCO "Recommendation on the Historic Urban Landscape" (UNESCO 2011) aims to integrate and frame the principle of sustainable development with conservation strategies in a long-term plan. It seeks to increase the sustainability of planning and design interventions by considering the existing built environment, intangible heritage, cultural diversity and socio-economic and environmental factors along with local community values. Interestingly, in 'Sustainable Building Conservation', Prizeman (2015) observes that the relationship between traditional and scientific knowledge is critical for sustainable conservation practice. While acknowledging the need for adaptation of historic buildings, conservation and sustainable principles are often considered contradictory, creating tension around integrity and authenticity issues. However, by providing a wide range of theoretical and practical examples, Prizeman (2015) advocates for integrating sustainable interventions into the conservation principles that respond to the local context's need. By analysing four different building typologies in the UK, Prizeman (2015) shows that the energy renovation of historic buildings requires tailored design solutions able to maintain the significance of the building. For example, timber-framed buildings have low thermal efficiency performance, and conventional energy upgrade solutions such as external insulation could affect the character of the building. Therefore, the design proposal should carefully consider the balance between the energy improvement of the building with the conservation guidelines. In the case presented by Prizeman (2015), the use of high-performance breathable materials within the existing wall and removal of all the cement render from the timber structure was deemed an effective alternative measure.

Sustainable building conservation contributes to a building’s adaptation to climate change reducing its impact on the environment. The growing understanding of climate change is also reflected in Disaster Risk Management (DRM) contemporary practice, to reduce the intensity and frequency of natural disasters and provide a broader perspective on the causes of such events. While adaptation

approaches to climate change and DRM came from different fields (IPCC 2012, 46), both seek to promote social, economic and environmental sustainability, including resilience, into the transformation process. Alexander (2008, 28) emphasises that sustainable development is a vital element of the DRM in all phases of the 'disaster cycle' such as mitigation, preparedness, emergency response, recovery and reconstruction. This integrated approach is conceived not only in terms of observance of building codes and structural strengthening but also requires the involvement of the local community in terms of developing knowledge and raising awareness.

By shifting the focus of adaptation methods to adverse climate conditions in a sustainable way, the concept of resilience has been introduced. The "Cultural Heritage, the UN Sustainable Development Goals, and the New Urban Agenda" (ICOMOS 2015), integrates cultural heritage into sustainable development goals (SDGs) for the world. In this document, the proactive role of cultural heritage is emphasised to enhance the resilience of the local community influencing the economic, social and environmental factors of the urban context. The target 11.4 of the Agenda 2030 considers the protection and safeguarding of cultural heritage as a way to ensure that human settlements are inclusive, safe, resilient and sustainable. It became apparent that there is growing consent among scholars (O'Brien et al. 2015; Holtorf 2018) that see cultural heritage as a driver for resilience, as it can adapt to different environmental contexts and external risks, contributing to sustainable development. Moreover, historic buildings have withstood the passage of time and therefore, natural threats by adapting to extreme adverse conditions. The capacity to adapt relates to the notion of resilience (as discussed in chapter 2) which in the context of DRM is defined as:

> The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

(UNISDR 2019)

The introduction of 'resilience thinking' into the field of conservation and DRM challenges the notion of stability and resistance that has characterised heritage policies and management over the past century (Berkes 2007). Nowadays, we all witness new forms of cultural, social and economic disasters confronting global society (one such topical example is the Covid-19 pandemic). This has led to a collective recognition that ecosystems are unpredictable and not stable. Uncertainty touches all aspects of our reality. Living with uncertainty is a familiar concept in the field of DRM as it is difficult to predict the impacts of natural hazards, especially earthquakes. Therefore, the understanding of resilient systems and how they can be fostered locally is becoming ever more urgent. O'Brien et al. (2015) suggest that resilience can be enhanced and preserved through social learning, which considers that people learn from each other, including such concepts as observational learning, imitation and modelling. For this reason, this research aims to investigate methods of conservation which focus on building resilient communities and cultural assets through participatory activities. This promotes approaches for better management of data and communication between different stakeholders. Thus, my research focuses on how community perspective should be integrated into this analysis in terms of risk perception and knowledge, which would add an intangible component, as a substantial element in the conservation process for cultural assets.

1.3 Local disaster culture and resilience

Finally, in this section, the relationship between disaster culture and resilience is highlighted to frame my study area of inquiry. In the last few decades, we have all witnessed the impacts of numerous international flooding events in various European cities and beyond, such as for example the current floods in NSW, Australia. It is acknowledged that this phenomenon is likely to increase due to the influence of two main factors: climate change and the large-scale change of land use due to massive urbanisation and agri-industry practices (Miller and Hutchins 2017). Likewise, an increasing frequency of severe earthquakes worldwide has

affected communities and cultural assets by altering the aesthetic character of entire historic centres and compromising the relationship between the local community and their built heritage.

Since the dramatic flooding in 1966, which affected the cities of Florence and Venice, international concern about the safety and protection of cultural assets located in areas at risk has increased. Although both historic cities were subjected to exceptionally high levels of water on the same day, in the case of Florence, the violent impact of the flooding further revealed the fragility of the historic buildings and especially of the artistic artefacts (Jokilehto 2011, 32; Glendinning 2013, 394). Arguably, this occurred because, unlike in Venice, where throughout the centuries efficient measures against tidal waters, known as *acqua alta*, were developed, the event in Florence was unexpected. Therefore, the community was not prepared to cope with it. It becomes evident that the extent of damage caused by a natural hazard depends on the preparedness and perception of the risk of local populations. These factors are considered in this thesis as part of the *local seismic or flood culture*. However, the definition of these two concepts will be further clarify in the following chapter. Here it is crucial to underline that historic cities, with their tangible and intangible elements, are not a passive resource but rather play a proactive role in response to a natural disaster by building resilience and reducing vulnerabilities (Jigyasu 2014, 11). Therefore, the emphasis of the *local disaster culture* of a specific community, in terms of its architectural traditions, skills and capacities, allows for the adoption of mitigation measures to cope with a natural disaster.

From a sociological and cultural perspective, Ulrich Beck's seminal theory of 'risk society' (Beck 1992, 30) asserts that the post-industrial response to 'new modernity' is characterised by a concern with managing risk, rather than the (re)distribution of power and wealth. Interestingly, he explores the gap between the elitist scientific rationality and more democratic social rationality. Although both rationalities are interdependent, Beck points out that adopting an exclusively techno-scientific approach, excessively self-involved and isolated within its methods

and procedures, will lead to failure. This failure will arise due to the exclusion of external, non-scientific knowledge which is created within communities and can be brought to attention via consultation and participation processes. Drawing on this distinction, Hewitt (2015, 19), argues that a technocratic stance prevails focusing on material realities in modern societies. However, he advocates for a balance between techno-scientific rationality and involvement of the community at risk. Reflecting on Beck's theory, it can be seen that in the western context of natural disasters in urban areas, the techno-centric approach has been generally adopted, minimising the influence of cultural aspects. More recently, many disaster recovery projects have failed because the local culture was ignored due to various aspects, including the psychological, economic and political. For instance, Alexander (2012) refers to the “adaptive pragmatism” in the recovery approach used after the earthquake in 2010 and 2011 in Christchurch, New Zealand. Most of the iconic neo-Gothic buildings damaged, which represented the character of the place, were demolished due to the perceived cost of reconstruction and a lack of confidence in unreinforced masonry buildings. The economic drivers of recovery and reconstruction have undermined the cultural identity and well-being of communities, favouring the loss of its heritage buildings and their values.

In contrast, in less-developed countries where indigenous, vernacular methods remain in use, the integration of local cultural knowledge into the process of prevention and rehabilitation of cultural heritage is an effective practice. This includes participatory approaches such as engaging communities in planning design and construction. An outstanding example is the Arg-e-Bam (Iran) post-earthquake reconstruction driven by UNESCO. The earthen citadel Bam was severely damaged by the 2003 earthquake, it was promptly added to the List of World Heritage in Danger in 2004 (UNESCO 2015). The international conservation community acknowledged the heritage significance of the citadel, and in the same way, it was a vital symbol of religious and national pride for the local community. For this reason, the reconstruction was the product of close collaboration between cultural institutions, universities, local artisans, and communities. Here a bottom-up

approach has been adopted. It is understood as a grassroots strategy aimed at empowering the local population through the transmission of knowledge, leading to an adaptation of the architecture to the different environmental conditions. Involving community proactively in the disaster aftermath allows the continuity of traditions and local practices as it is a source of "remembering and forgetting, not only through memories but also through the fashioning of identity and thus through our need to recognise ourselves in the past" (Wenger 2008, 88). Therefore, especially in the western context, where a technocratic approach is favoured, it is crucial to emphasise the local culture's role in historic cities. That would be possible by underlining the importance of a cultural and resilience perspective in the DRM process to recover the built heritage.

The concept of resilience, introduced into the conservation field, offers a means to interrogate both the tangible components of heritage such as material structures and components and the intangible ones namely traditional craftsmanship and local construction skills (Luciani and Del Curto 2018). Thus, this research focuses on developing a methodology for the resilience assessment of specific historic buildings. This new method aims to depict the complexity of built heritage, including aspects related to tangible and intangible values. It also investigates how relevant local stakeholders' and institutions' behavioural responses play into the conservation and adaptation of historic buildings. This results in a complex triangle of technical understanding, organisation and policy, and social and cultural responses that seldom interact.

1.4 Research question

Drawing on this initial body of literature, it became apparent that the notion of resilience has become predominant in the current theory of disaster risk reduction, suggesting a positive and proactive approach towards community engagement. Yet, despite major efforts to introduce and implement the concept of resilience within the management of cultural heritage, there have been few attempts to translate

theoretical knowledge into practice. This has led scholars to question the validity of the concept of resilience, arguing it is at risk of becoming another buzzword in the academic debate (Davoudi et al. 2012; de Bruijn et al. 2017). Moreover, a clear understanding of the meaning of resilience is lacking in more practical fields such as architecture and planning (Davoudi et al. 2012). Thus, as a conservation practitioner and researcher, my guiding research question is "*How can we apply resilience thinking into the management of historic buildings located in areas exposed to natural hazards such as earthquakes and flooding?"*. This broad question implies that there is not an absolute definition of resilience. Rather, it allows for the experimentation of practical and participatory methods to enhance an understanding of aspects that form resilience thinking. Reflecting on these issues, this research aims to fill the gap in the body of literature concerning those elements that can support the assessment of resilience at building level. Thus, the specific research question is:

How can the resilience of historic buildings located in seismic and flood risk areas be represented and assessed in relation to the local community and its heritage values?

The words 'represent' and 'assess' have been deliberately chosen as practical actions to provide an empirical answer to the main research question. The first action, *represent*, is developed using *spatial analysis* which is traditionally used to represent risk in urban areas through maps (Brown et al. 2002; Lanza 2003). However, in this study, maps combine material aspects of resilience with intangible elements associated with heritage values, perceptions and human behaviours. Therefore, participatory maps are developed to reveal aspects of resilience which differ from the predominant risk-vulnerability narrative. The second action, namely *assess*, aims to define resilience and how it relates to the local context. Social methods and quantitative assessment techniques have been combined to demonstrate the multifaceted nature of resilience. This mixed-methods approach is a useful tool to respond to the question of the resilience *of what* and *to what* posed

by Carpenter et al. (2001). It also helps to unpack the different levels of resilience theorised by Cutter et al. (2008) in relation to the social, cultural and physical environments.

In order to construct an answer, it is argued that resilience is both an inherent characteristic of cultural assets, depending on their physical condition, material and construction techniques, and an externally constructed characteristic related to less tangible aspects such as human behaviour, economic conditions and conservation management. Therefore, the local disaster culture of a place offers an ideal context for developing a new understanding of resilience. The narrative of experiences in the aftermath of a disaster shapes the local disaster culture and consequently forms a specific identity connected with the threat of risk. For this reason, as well as employing a technical approach, it is argued here that understanding the relationship between how a specific community adapts and responds to risk and their associated values with cultural heritage, is a way to foster resilience.

1.5 Aims and Objectives

Developing an understanding of how the concept of resilience applies in areas affected by floods and earthquakes is the main aim of this research. This envisages a comparative study in which the concept of resilience is explored in relation to heritage assets and the people affected by the natural hazards. While the causes of hydrological and seismic hazards are different, the damage is exacerbated by the lack of preparedness and risk awareness of the local community, with consequences for their built heritage. Contrastingly the causes of flooding are to some extent predictable and in part determined by human activities whereas an earthquake is defined by Alexander (1993, 42) as an 'archetypal sudden impact disaster' because its warnings are challenging to identify.

Therefore, this study seeks to identify different ‘levels’ or ‘dimensions’ of resilience in the two distinct contexts of York (UK) and Amatrice (Italy). It

investigates the engagement of different stakeholders with their built heritage in the aftermath of a disaster event. The different nature of the hazards (hydrological and seismic), influences the resilience of the contexts, shapes different perceptions of the risk suggesting alternative ways of adaptation and coping. Therefore, a novel approach to describe and assess resilience is proposed, combining participatory mapping and social research methods. The following objectives are stated and will guide the analysis of the data described in the empirical chapters:

- Review the resilient practices and capacities traditionally developed and the current adaptation measures adopted. These practices are identified as the 'local disaster culture' of a place, respecting seismic and flood threats, as they represent how communities and historic buildings adapt to external risk.
- Understand how the contemporary or 'new' flood or seismic culture is nurtured and developed in response to increasing risk.
- Identify the different elements or indicators that describe resilience in terms of its tangible and intangible features.
- Raise the awareness of the different institutional stakeholders, such as governmental, non-governmental, voluntary and other community-based organisations, of ways in which local communities and historic buildings adapt and cope with an external risk. This aim is to inform a long-term decision-making process relating to the resilience of the buildings, their past seismic and flood history and mitigation measures adopted. Including the perception of the risk and preparedness for the long-term planning and mitigation methods is vital.

The principal practical outputs of the research will be the implementation of participatory maps to describe and assess the resilience of the two historic centres. The use of the maps is directed towards the following results:

- The provision of an alternative assessment of the historic buildings located in flood and seismic risk areas leading to the adoption of the new resilience paradigm.

- The development of two online interactive maps as tools for enhancing risk awareness and social learning and guide adaptation practices.

1.6 Case study areas

The research question is posed in relation to two case studies exposed to flood and earthquake events in Europe, namely York, UK, and Amatrice, Italy. This will offer two different contexts for the mapping application, associated with local resilience practices and understanding. By integrating DRM with cultural heritage studies, the resilience features are elucidated in relation to the urban space, construction techniques, adaptive measures, social dynamics and heritage values. The concept of resilience is investigated using qualitative and quantitative analysis. While the York case examines the resilience of the community and historic buildings after the 2015 flood by showing the adaptation measures adopted, the Amatrice case study aims to investigate the resilience after the 2016 earthquake, focusing on the ongoing rehabilitation process and the recording of heritage values of the historic centre. More specifically, in chapter 6, the York case study looks at the immediate aftermath of the flooding in terms of the rehabilitation process and the change in the perception of the risk of flooding. The relationship between resilience and the different buildings is examined according to their typologies (historical period, listed status, materials and type of construction), functions (residential, shops, public space, museums) and locations (near the river Ouse or river Foss). Thus, this case study will allow a practical understanding of the resilience of the historic centre of York.

Figure 1.1: River Foss 2015 flooding in York city centre ©Catherine Sotheran

Figure 1.2: Historic centre of Amatrice after the 2016 earthquake ©Alessandro Grassani for The New York Times

On the other hand, the case study of Amatrice (chapter 7) presents issues connected with the severe material and physical loss of the cultural heritage and community displacement in the aftermath of an earthquake. Here, the relationship between the local community and the territory is highlighted in terms of a sense of place, awareness of the risk, cultural identity and values associated with the buildings' fabric. The reconstruction process is also examined under the lens of 'resilience thinking'. This provides an alternative methodology to inform decision-making process and future reconstruction guidelines. By comparing these two case studies, it will be possible to clarify the different levels of resilience connected to a context and test the methodology in terms of the transferability of both qualitative and quantitative analysis. The significant differences can be seen most clearly in the fact that while in the York study there was an almost total recovery within a year, Amatrice remains an unfinished large-scale recovery operation.

1.7 Why researching resilience in the context of cultural heritage matters

This section will illustrate the motivation behind my study by explaining the personal and academic contexts that have guided my research inquiry and methodological choices. At the beginning of my career as a conservation architect, I worked in several seismic risk areas in South America and Italy, recording local traditional building systems and implementing seismic retrofitting solutions. Learning how to interpret traditional knowledge and construction techniques for improving the condition of historic buildings helped me to realise the importance of enabling the local community to be part of the project. The participation of the community in terms of capacity building, skills exchange and transmission of local knowledge was a key aspect for the sustainability of these projects. Indeed, traditional knowledge "reflects the interconnection between the community and its environment, providing a sense of continuity and identity" (ICCROM 2020). For this reason, understanding the cultural and social context was crucial in providing solutions for adapting the buildings in continuity with past traditions and ways of living. From these practical experiences, the central role of resilience in the conservation field became apparent.

The promotion of resilience thinking, intended as a process of adaptation and vehicle between past and future of heritage assets, is strongly related to community participation in embracing and sustaining change.

Natural hazards and ecological uncertainty increasingly threaten the continuity of built heritage and show the fragility of the relationship between community and its heritage. The current COVID-19 pandemic has further exacerbated the pre-existing vulnerabilities of cultural heritage, especially in our historic centres. The cases of Venice and Florence are exemplary. Due to the fall in tourism, these Italian cities have been deprived of their principal source of income. According to The United Nations World Tourism Organization (UNWTO), the drop in international tourism in the first half of 2020 represented a loss of about $460 billion (USD) (UNWTO 2020). In addition to the economic impact, the lack of tourists has caused a dramatic social impact, showing the pre-existing erosion of the local community in historic city centres. Indeed, the lack of functional diversity in these historic centres, in terms of building usage (i.e. over-reliance on tourist income/use) lead to a cultural identity crisis and economic collapse during the extensive period of lockdown and social isolation. This is because the urban structure of the historic centre has been developed to accommodate a large number of tourists. This has diminished the provision of fundamental goods and services in the central areas of these cities, causing a displacement of local citizens to suburban areas (UNESCO 2020a). These examples show that the transformation of urban centres into tourist attractions results from unsustainable development strategies that have had a concrete short term impact and cast into doubt the future usability of these cities for local citizens. Maintaining diversity and redundancy is a key aspect of the resilient thinking approach. According to Leitaõ (2018, 6), the retention of diversity and redundancy ensures the resilience of a social-ecological system by compensating for the loss or failure of components.

Post-crisis recovery requires an open confrontation with critical questions concerning the role of resilience in the context of cultural heritage. This is an issue

connected with the broader themes of social, environmental, and economic sustainability. Adaptation is a crucial process to overcome the uncertainty of the future. An example of adaptation is provided by some Italian cultural institutions, such as museums and archaeological sites (Erbani 2021). These institutions responded to the COVID-19 crisis by reinventing and challenging their traditional role. In a recent article, Erbani describes museums' efforts to adapt by becoming a dynamic space for social and cultural interaction, offering a wide range of diverse activities that are not necessarily connected with tourism, but rather with the local community.

> Hope locates itself in the premises that we don't know what will happen and that in the spaciousness of uncertainty is room to act. When you recognise uncertainty, you recognise that you may be able to influence the outcomes – you alone or you in concert with a few dozen or several million others.
>
> (Solnit 2016, xii)

The above quote from Rebecca Solnit reminds us that people's actions and participation are fundamental for the co-creation of new social and physical landscapes in times of crisis. The acceptance of risk and uncertain conditions is a catalyst for collective resilience. The proactive role of people in relation to their cultural heritage resonates with the resilient thinking approach and the conservation of traditional knowledge. This is emphasised by Fluck (2020), who underlines the efforts of national institutions such as Historic England and expert groups such as 'Climate Heritage Network' to value and integrate traditional knowledge and local culture into heritage discourse and policies. The central role of people and an open and democratic discussion of heritage is, according to Fluck (2020), a crucial factor for successfully tackling external threats such as climate change.

Another aspect emerging in the above quote (Solnit 2016, xii) is the role of 'hope'. Solnit recognises 'hope' as a revolutionary driver for change rooted in the

collective memory of a community. She states that while 'hope' is forward-directed energy concerning the future, the ground for it "lies in the records and recollection of our past" (Solnit 2016, xvii). Arguably, in the context of cultural heritage, 'the recollection of our past' can be associated with the role of 'collective memory' in promoting local knowledge and traditions while adapting to different external conditions. Similarly, the future-oriented conceptualisation of 'hope' resonates with the capacity of resilience thinking applied to heritage assets to transform, change and adapt. Thus, my PhD research responds to the urgent need to propose a concrete application of resilience thinking to heritage places. In so doing, it addresses the challenge of using participatory, people-centred and value-led approaches to explore and reimagine alternative paths in the context of cultural heritage at risk.

1.8 Thesis chapter outline

This final section summarises the structure of the thesis. The main themes and scholarship that it draws from are highlighted. The chapters are structured as follows:

1.8.1 Theory chapters

The literature review is structured in two main chapters. They establish a connection between the concept of resilience with values-led heritage conservation approaches. The first part, chapter 2, is based on the review of the literature related to cultural heritage and natural hazards and elucidates the terminology and the existing knowledge in the field. It begins by outlining the relevant frameworks in the DRM focusing on the relationship between cultural heritage and the local community and risk. The predominant role of culture in the disaster field is highlighted by the promotion of international policies such as the Hyogo Framework for Action (HFA) (2005-2015) and the Sendai Framework (2015-2030). It leads on to the definition of a tangible and intangible disaster culture based on the study of local knowledge

developed traditionally in the area at risk. Here I explore the meaning of local seismic culture and local flood culture, which are considered key concepts that have guided the contextual analysis of the two case studies in chapter 5. The second part of the chapter introduces the notion of 'resilient thinking' and its fundamental components, namely persistence, adaptability and transformability (Folke et al. 2010). In order to explain the paradigm shift in the DRM from a technocratic approach toward a community and cultural-based one, the concepts of vulnerability and resilience are described and compared. A theoretical review of the two terms examining their impact on the built environment is outlined, showing assessment and representation methods. The implications of the theoretical understanding of vulnerability and resilience in the DRM is used as a basis for the development of the methods of research proposed in this study.

Chapter 3 is the second part of the literature review. It outlines past and current conservation approaches in areas at risk, tracing best practice development through international case studies. The main argument of the chapter is to establish a connection between the emergent value-led conservation approach and 'resilient thinking' through the understanding of the role of tradition and local knowledge. The promotion and understanding of local traditions is seen as an aspect of resilience which guarantees the continuity, within change, of a cultural system. The concept of continuity indeed is described in relation to tradition and resilience, bringing together theoretical perspectives that sustain the initial argument. In this thesis, value-led conservation theories are connected to the use of participatory approaches which are able to depict less traditional heritage values such as the social value. Thus, the second part of the chapter focuses on participatory methods. Firstly, a history of participatory practices in the field of architecture and urban design is traced, drawing on the celebrated sociological theory of Arnstein (1969). Finally, the method of cultural mapping (Avrami et al. 2019) is described as a way to explore the dynamic between heritage people and places. The notion of 'space', as discussed by Giddens (1990) and Lefebvre (1991), is central to support the use of maps. Maps, in this sense, are used as a tool to define the values and social

interactions that have shaped the physical expression of the historic centres of York and Amatrice.

1.8.2 Method chapter

Drawing on the issues and theories discussed in the previous chapters, chapter 4 presents the methodological choices that have guided my research. A more detailed account of the research design is presented, where methods and techniques are discussed and justified, as well as the key research problems presented in the previous chapters. Central to this is the use of Participatory Geographic Information System (PGIS) which uses qualitative and quantitative research data. This chapter responds to the primary research challenge: to visualise the concept of resilience in two different cultural and geographic realities. Working with the idea that resilience is a concept connected and constructed within the local context, I developed different methods to address the local issues and necessity of the two case studies. For example, in York, due to the vast accessibility of data, it was possible to experiment with a quantitative method to assess resilience as well as use qualitative methods such as a focus group and semi-structured interviews. Whereas in Amatrice, a participatory value-led mapping workshop was held in response to the severe destruction of cultural heritage subsequent to the 2016 earthquake, the dissemination of the resulting activities was also a substantial factor in the methodological choice. A web-based method is proposed through the GIS online software known as ArcGIS online and is used experimentally to support social learning drawing on the existing knowledge and capacities of the community. The development of thematic maps, which integrate both objective (technical) and subjective layers (perceptions and views of the local community) of knowledge, proves to be a way to engage and increase community awareness and integrate local disaster culture.

It is possible to consult the resulting interactive map at the following links:

Mapping York Resilience: https://arcg.is/1SXmqm

Building Amatrice Resilience: https://arcg.is/ObyDa

1.8.3 Data and analysis chapters

The empirical chapters section begins with the contextual description of the two case studies in chapter 5. Firstly, I use the concept of local disaster culture to narrate the historical development of the two historic centres. This includes describing the geographical, social, architectural and cultural elements shaped by the local disaster culture. Looking at the local context, I then reflect on the national policies and approaches that have, historically and currently, influenced the resilient thinking of the two-cities. The second part of each case study provides an example of citizen-led activity and grassroots movement raised in the aftermath of the disaster. These examples are fundamental to understanding how community participation is an engine for resilience and change while contributing to the conservation of cultural heritage. Chapter 6 and 7 present the data collected for the two case studies, namely York city centre and Amatrice. The case study description follows the same structure, allowing a comparative analysis of the themes that emerged during the data coding. However, due to the different research contexts and the limitations described in the methodology chapter, the nature of resilience is investigated using different approaches, as referred to above, to visualise the concept of resilience in two different cultural and geographic realities. These differences highlight the multifaceted nature of the resilience thinking developed in the two historic centres. Maps are the main instrument adopted to represent tangible and intangible aspects of the local disaster culture, using qualitative and quantitative data to answer the main research question. To conclude, the resilience assessment based on the GIS analysis is presented using participation methods of gathering data.

1.8.4 Discussion and conclusion chapters

The last part of the thesis, chapter 8, contains the discussion of the research. First, the results obtained are discussed by comparing the two case studies. Based on the analysis of the empirical chapters, the comparative discussion follows three main themes. These headlines highlight the different understandings of resilience in seismic and alluvial contexts. The topics discussed are critical elements of 'resilience thinking'. The purpose of the chapter is to provide a comprehensive answer to the main research question. The effectiveness of interactive maps is discussed, showing the limits and positive results of the method. There is evidence that adopting resilience rather than vulnerability assessment could offer a more holistic perspective in terms of analysing historic buildings located in areas prone to floods and earthquakes. Furthermore, resilience is considered a "quality" or "action" intimately connected to the contextual environment. Finally, the relationship between tangible and intangible practices of adaptation and resilience is outlined. This suggests a pragmatic understanding of resilience as a 'creative process' related to modern theories in the study of heritage.

The conclusions in chapter 9 summarise the research steps and achievements. This study is framed into the current research context highlighting its original contribution and the limitations encountered during the past years. Finally, the next research steps are suggested, defining possible future research looking at the broader academic and professional community and the impact on the local community.

2. The role of local disaster culture in resilient thinking

This chapter illustrates the potential significance of a culture-based approach in reducing disaster risk for historic buildings, highlighting the importance of local culture to enhance resilience practices. In the first part of this chapter, the concept of culture, embedded in historic buildings, is explored within the context of natural disasters. By introducing the concept of resilience, associated with historic buildings, as an alternative to the vulnerability approach, the development of a risk culture is outlined. Here the relationship between local culture and risk response is defined through the tangible and intangible elements of the built heritage. As will be discussed throughout this thesis, traditional knowledge plays a central role in supporting resilience practices and ensuring continuity. In this study, the relationship between traditional knowledge and resilience practices has been defined as the *local seismic culture* and *local flood culture* of a community that live in areas exposed to natural hazards. The second part of this chapter deals with the concept of resilience thinking as a product of the interdependent relationship between local culture, society and environment. Thereafter, the dichotomy between the concept of vulnerability and resilience is illustrated. The introduction of these concepts distinguishes two DRM approaches: one more technocratic and the other that includes the community perspective and their capacities. For the purpose of this research, the theoretical and analytical framework around these two concepts is used as a tool to mitigate risk in the decision-making process in areas exposed to hazards. Finally, various models of assessing vulnerability and resilience are examined, which foreground the choices made in the methodology chapter.

2.1 The link between Local Culture, Heritage and Disasters

Historic built heritage is the tangible expression of the culture of a place. It can represent the identity of a community in relation to its historical inheritance, aesthetics canons and system of beliefs (Chitty and Sprega 2018). The sudden effects of natural hazards corrode the continuity and development of these values within a community. However, historic buildings were designed in terms of construction techniques, materials and architectural typologies, which allowed the building to structurally respond and adapt to different environmental conditions, geographical contexts, and social and economic changes. This presumes that historic buildings possess both vulnerable aspects and inherent resilience, understood as the capacity to accommodate and deal with external risk such as natural hazards (Özel, Dipasquale and Mecca 2014). Considering built heritage as a *continuum* in evolution and adaptation allows the introduction of the notion of local culture as an element to mitigate and reduce the risk. In the natural disaster context, the role of culture in the preservation of cultural assets has often been neglected by favouring technocratic and scientific approaches (Krüger 2015). Indeed, it is only in recent years that the role of culture has been emphasised focussing on social dynamics in disaster preparedness and response. This is evident in the adoption of international instruments such as the Hyogo Framework for Action (HFA) (2005-2015) and the Sendai Framework (2015-2030). One of the activities promoted by the HFA is promoting traditional and local knowledge, innovation and education to build a culture of safety and resilience at all levels:

> Provide easily understandable information on disaster risks and protection options, especially to citizens in high-risk areas, to encourage and enable people to take action to reduce risks and build resilience. The information should incorporate relevant traditional and indigenous knowledge and culture heritage and be tailored to different target audiences, taking into account cultural and social factors.
>
> (UNITED NATION 2005, 9)

Similarly, the Sendai Framework encourages a culture of prevention and education on disaster risk advocating for resilient communities. Indeed, the actions promoted by the two documents are based on participatory democracy, the management of risk and knowledge, education and preparedness (Alexander and Davis 2012). Central to this is the community's role, which is 'active' in the risk reduction by participation and people-actions.

This turn towards participatory practices represents a first significant shift in the disaster risk policies and theories. Following the discussion in the previous chapter (section 1.1), O'Keefe et al. (1976) recognise that the term 'natural disaster' is misleading because it emphasises the natural cause of the disaster. In contrast, they point out that many disasters result from a combination of natural hazards and social and human vulnerability. It is necessary to restate the definition of disaster provided by Oliver-Smith (1999, 28) already discussed in the introduction. His anthropological perspective is crucial to understand that disasters occur in society, not in nature, and develops within the dualistic dynamic between human society and material culture. Thus, according to Oliver-Smith, disaster represents the failure of humans to interpret and understand the environmental issues associated with their actions. It could be argued that traditional architecture represents the integration of human activity in healthy balance with its environment. This harmonic relationship results from vernacular structures. They manifest the community's awareness and knowledge accumulated over time about the local and natural environment and embedded risk. This concept will be further developed in the next section. Here it is highlighted that natural disasters are caused not only by exceptional natural events. They are the product of a lack of awareness of the risk caused by the social, political and economic environment. From a sociological perspective, natural hazards are only detrimental when the community response is not sufficient to cope with the event (Weller and Wenger 1973).

Understanding the local culture of a place is crucial to reduce the risk and vulnerability of cultural heritage and influence the recovery process. This is evident

in several disaster experiences worldwide, where attention to local building traditions has been undermined. For example, in 2003, an exceptional earthquake destroyed most of the earthen buildings of the historic walled city of Arg-e-Bam in Iran. Langenbach, who participated as a specialist consultant in the UNESCO mission four months after the earthquake, noted that most collapsed buildings were those recently restored, whereas the buildings without any modern intervention survived with minor damage. In his report, Langenbach (2005) explains that the reason for the extensive damage was the inappropriate restoration techniques which had caused the loss of clay cohesion. While traditionally, the fibre used in the mixture, as a reinforcement, was shredded date palm bark, in the modern restoration, straw was used, which attracted termites to infest the wall. As will be extensively discussed in chapter 5, similar unintended consequences can also be seen in the devastating series of earthquakes in various small towns in the centre of Italy (such as Amatrice, Norcia and other villages) in August 2016, which caused not only losses of human life but also damage to a unique and irreplaceable cultural heritage. The amount of destruction and the extent of the damage was attributed to inadequate preventive measures in the fabric of the historic buildings. It was reported that the majority of the historic masonry buildings which were damaged or even destroyed were characterised by the use of poor-quality construction materials, incongruent additions and modern restoration interventions (D'Ayala 2017). These interventions were promoted in the 1980s when this area was declared a high seismic activity region (zone 1 in the Italian code). Unfortunately, there was widespread confidence in the use of concrete to strengthen historic buildings, which exacerbated the seismic damages. These accounts of disasters are crucial to understanding the importance of knowing the traditional techniques, materials and culture of a place. They also provide a practical example of the global disaster scenario that has led the international community to shift their policies and guidelines towards a culture of prevention, incorporating local knowledge. This premise underpins the key arguments elaborated in the following sections, highlighting the relationship between culture, risk and finally, resilience.

2.1.1 Culture of Risk

It is difficult to give a single definition of culture in relation to risk. In 1952, after research into the anthropological literature, Kroeber and Kluckhohn found 164 different definitions of culture (Oliver-Smith 1999, 18). However, as previously stated, it is essential to highlight the notion of culture in the context of disaster. One shared definition among scholars is that culture is a dynamic process that develops in a specific place and is continually changing, and whilst it existed in the past, it may have become lost. The 'IFRC World Disasters Report 2014 focus on Culture and Risk' provides the following definition of culture developed in an area at risk:

> Culture consists of beliefs, attitudes, values and their associated behaviours, that are shared by a significant number of people in hazard-affected places. Culture in relation to risk refers to the ways that people interpret and live with risk, and how their perceptions, attitudes and behaviour influence their vulnerability to hazards.
>
> (Cannon 2014, 14)

This definition reflects the broader context in which culture is related to society's development in relation to risk, considering tangible and intangible aspects. Bankoff (2015) points out that the interaction between culture and risk, from a pragmatic perspective, is the "adaptation to the risk inherent to the local environment". Therefore, the culture of the risk shapes and adapts the environment, including the buildings. As will be discussed in the following section 2.3, vernacular architecture is arguably one visible manifestation of cultural adaptation to the risk over time.

According to Wenger and Weller (1973), it was the American sociologist Moore, in 1964, who proposed the concept of a disaster subculture as:

> Those adjustments, actual and potential, social, psychological, and physical, which are used by residents of such areas to cope with disasters which have struck or which tradition indicates may strike in the future.

(Moore 1964, 195)

Moore states that the nature of a disaster subculture is inherent in the knowledge of elements that have traditionally supported and survived external hazards. Maintaining and preserving traditions is crucial for the development of a subculture in relation to future risk. Furthermore, three other factors promote the development and perpetuation of a disaster subculture. The first is that the hazard occurs frequently, and therefore it is possible to analyse a typical pattern of risk. Secondly, there is a forewarning of the event, and finally, that it has severe consequences that subvert the daily routine of the community, causing uncertainty, disorder and sociocultural collapse (Wenger and Weller 1973, 9).

Moore categorised the subcultures of risk into two groups, namely latent and manifest. The latent aspect of a subculture emerges only during the unfolding of a disaster or in its aftermath, whereas manifest elements of a subculture are integrated into a place's broad culture. The nature of manifest elements is considered in terms of instrumental and expressive behaviour. Instrumental behaviour encompasses all the norms, procedures, activities and technological resources that provide a preventative response to the hazard. In contrast, all the values, beliefs, legends and myths are referred to as the expressive behaviour in terms of how the risk is perceived in the collective imagination of a community (Wenger and Weller 1973, 4). This distinction expresses the urgency to provide a holistic evaluation of hazard impacts considering human agency and social systems. Interestingly, as discussed further in the next chapter, heritage ideas have developed to include intangible aspects of a culture. The contemporary definition of tangible and intangible heritage, given by the UNESCO (2003), can be applied to the culture of risk of a specific community related to cultural heritage. Indeed, as discussed above, the intangible component of heritage includes local and indigenous knowledge and practices. In this thesis, the contraposition between instrumental and expressive elements suggested by Wenger and Weller in the 1970s is equated to tangible and intangible elements used to respond to natural hazards. Therefore, the tangible or 'instrumental elements' analysed refer to the architectonic and structural solutions that enhance

the resilience of a building, whereas the intangible or 'expressive' represent the cultural response of the local stakeholders affected. This distinction reflects the central stance of resilience thinking in which adaptation of a system is intended from both a structural and non-structural perspective in terms of social learning and preparedness. As discussed in the following section, intangible elements of resilience can be manifested in concrete outcomes that form the local disaster culture of a place.

2.2 Tangible disaster culture

From a sociological and anthropological position, adaptation to disaster is key to understanding the human use of the physical environment in terms of the strategies adopted by individuals to cope with external conditions. The design of shelter is a primary activity in response to the need to provide safer living conditions. The vernacular architecture around the world represents an example of this. Indeed, traditional buildings were constructed using shapes and constructive details to reduce their vulnerability to hazards and provide a degree of protection and comfort. In the exhibition 'Architecture Without Architects', organised at the Museum of Modern Art of New York by Bernard Rudofsky, there was a first attempt to record the different architectural solutions of vernacular building. In the preface of the catalogue exhibition, Rudofsky (1965) points out that vernacular architecture is a spontaneous and continuous form of art derived from the communal experience of the whole community who participate in the construction and conservation of the dwellings. The interest in vernacular architecture is reflected in the seminal work of Paul Oliver, covering the understanding and development of traditional construction typologies. He observed (Oliver 1987, 125), that indigenous builders learnt to accept the cycle of natural disasters by adopting preventive measures to contain the damage to the structures. The concept of adaptability is also reiterated by Pierotti who states that buildings:

> Correspond to his [the human] ability to use freely its intelligence to introduce these extensions of himself into the environment, which in turn

> allow him to adapt to every external condition and situation.
>
> (Pierotti 2005, 29)

The recent publication on vernacular architecture by Sandra Piesik (2017) titled *HABITAT* is a comprehensive documentation of the variety of traditional buildings in relation to local climate and material. According to Piesik (2017,19-20), the understanding of the indigenous community's unique material culture is fundamental to assess the significance of a place. Moreover, the local culture plays a central role in developing sustainable management of natural resources against the threats to climate change, improving socio-economic and environmental resilience. Thus, the vernacular buildings lessons inform our understanding of the historical development of physical mitigation measures adopted in buildings located in areas at risk of environmental hazards. In this research, those measures are representative of the local seismic culture and local flood culture of a community described in the following sections.

2.2.1 Local seismic culture

The local seismic culture is intimately connected with the concept of adaptability to external environmental conditions and risks. This relationship has mainly been studied in seismic areas, where locally evolved construction systems have been adopted to mitigate the action of earthquakes. Archaeological findings have indicated that the most ancient civilisations adopted measures to contain seismic actions. The case of the pre-Columbian civilisation of Caral, one of the most ancient in Latin America, is emblematic. Architectural elements related to the anti-seismic culture of the place were found in the platform foundations of one of the pyramids called *La Galeria*. The foundation is composed of stones enclosed by vegetable fibre ropes that increase the resistance and the cohesion between the various elements if affected by an earthquake (Vargas Neumann and Guerrero Baca 2015). A second example is in the archaeologically well-conserved remains from the House of *Opus Craticum,* in Herculaneum in Italy, which demonstrates the Roman's construction

techniques, which consisted of timber-framed infilled masonry. Although Vitruvius, in his *De architectura*, described the *Opus Craticum* as a dangerous technique prone to fire: "I could wish that it (Opus Craticum) had never be invented … for it is made to catch fire, like torches" (Vitruvius II, 8, 20), this technique, over the centuries, proved effective to increase the resistance of buildings against earthquakes (Langenbach 2007). Indeed, after the fall of the Roman Empire, this constructive method became popular in various countries of Europe, such as Turkey and Greece. This technique was adapted to the local context and assumed different names, such as *pan de bois* in France, *fachwerk* in Germany, *hımıs* in Turkey, and half-timbered in Britain (Langenbach 2007, 35). This technique was exported by the Iberian conquest to the Americas and became known as *bahareque in* central America and *quincha* in the south and was integrated into the indigenous monumental seismic architecture. Indeed, in the city of Cuzco in Peru, the colonial *casonas* are characterised on the ground floor by the massive Inca stone (talus walls), and buttresses whereas the first floor is built with unfired bricks, *adobes* and *quincha* panels. This technique's effectiveness was recognised after the terrible earthquake in Lisbon (1755) and Calabria (1783). In these cases, the reconstruction and the new seismic code were based on the use of timber-framed structures infilled by brick. In fact, the centre of Lisbon was built using the *gaiola* (cage), a technique which is essentially a well-braced form of half-timber construction. This technique was used most recently as an inspiration also for post-earthquake reconstruction in the south of Italy with the development of the typology of the *casa barraccata* (Ruggieri and Zinno 2015, 43-52).

Therefore, it is widely recognised that local building techniques in high-risk areas have always developed a specific local culture, though using different materials and constructive design depending on local needs and available resources. Ferrigni et al. (2005) defined the local seismic culture of a community as:

> The bulk of knowledge (regarding the nature of the seismic shock, the susceptibility of the ground and the architectural heritage to it, anti-seismic building techniques that have proven to be the most effective

> locally, etc.) it has accumulated and the mode of behaviour it has developed consistently with such knowledge.
>
> (Ferrigni 2005, 210-211)

The project of Ferrigni, within the European University Centre for Cultural Heritage (EUCCH) of Ravello in Italy, aimed to promote research, training and consultancy programmes related to the protection of cultural heritage in seismic areas. Ferrigni identified in different historic centres of Italy all the architectural features connected to the urban structure and its evolution that represent the construction *anomalies* of the building, such as buttresses, niches, countered arches, designed to reduce the earthquake impact. Therefore, in the traditional field of architecture, an anomaly is defined as an unusual detail or a variation of the technology used in historic buildings, which alters the ordinary construction methods to adapt to the environment (Ferrigni et al. 2005, 102-103). These construction exceptions introduced into the building are gradually absorbed and constitute a tangible element of the local seismic culture of a place.

2.2.2 Local flood culture

Over the centuries, also in flood-prone areas, the environment has been shaped to adapt and respond to environmental risk. However, the material evidence of a flood culture has often been overlooked compared to studies on seismic areas. This lack in the literature could be due to floods being regarded as more manageable physical events requiring primarily technological solutions (Bankoff 2003), although historically, the local flood culture is often included in the decision-making process in terms of urban planning and water management on a large scale. In areas exposed to flood, the water became an integral element in designing the urban spaces. Examples of this can be found in planning historic complexes such as in China's ancient cities (Qingzhou 1989) and Ayutthaya (Daungthima and Kazunori 2013). These are outstanding examples of flood-proof architecture design.

In light of this, it would be helpful to analyse historic buildings located in the Venice Lagoon, which are traditionally affected by the rise in the canals' water level. The technological approaches and the typology used, such as anti-flooding techniques, which form the traditional preventive culture of the Venetian community, can be identified. When analysing the survey of the Venetian vernacular buildings conducted by Goy (2010, 35), it is noticeable that almost all the traditional elements of the Venetian buildings allowed for structural movement and settlement and were meant to protect the vulnerable material from water infiltration. For instance, in the brick façades and foundations, Istrian stones were used, which are less porous and consequently more resistant to water damage. The knowledge of these elements is crucial for the preservation of the historical structures in Venice. Similar attention to design against flood has been observed in the Confucian temple in Deqing County Guangdong in China, which was built in the 13th century and has withstood over 90 floods. The building was constructed over a high platform, and high stones thresholds, tall columns with stone bases and brick walls were used to prevent water damage. Pile foundations were widely used for water gates and culverts to avoid flood erosion (Qingzhou 1989, 206). Therefore, it is apparent that the design of a structure is a product of the external risk in particular situations.

Langenbach (2015, 39) suggests a recent reinterpretation of the famous Mostar bridge's design, the Stari Most, an example of the Ottoman architecture of the 16th century and a World Heritage Site. The bridge was deliberately destroyed and then rebuilt after the Croatian-Bosnian war in 1993 and became a symbol of a reconstruction approach after a human-made disaster. However, the bridge is an interesting example of the local flood culture design. By comparing two pictures of the bridge, one before the 2014 flood and the second during the event, Langenbach realised that the design and the technology of the structure were conceived by the builders based on past experience of floods in the area and anticipating such future events. In fact, the distinctive arch curvature was created to avoid the upper part of the bridge coming into contact with the water.

Furthermore, we can identify examples where the landscape is also shaped to accommodate the flood risk. Early Dutch defences against flood are identified in the typology of the 'terp mounds' dwellings. From around 500 BC, settlements along the Dutch coast were constructed on terps, or artificial mounds built above typical high tide and surge levels so that floods would no longer destroy communities. Large constructed mounds enabled permanent settlement in the fertile areas near the coast and rivers in the Middle Ages. During flood periods, villagers and their livestock would retreat to the central mound with little risk of loss of life or property. Indeed, the floods were beneficial, depositing fine sediment on the floodplains that helped improve agriculture. The 'terp mound' was a very resilient system of flood protection. Churches and houses were built on mounds, so their vulnerability to flooding was greatly reduced, while agricultural fields that could be flooded without significant damage were allowed to be inundated. With sufficient warning, loss of life and property (including valuable livestock) could be virtually eliminated by the local population taking refuge on the terp, while the natural process of flooding was not interrupted. Nowadays, in the Netherlands, the traditional approach of the 'terp dwellings' is promoted by constructing different types of flood-proof houses such as the pile-house, the floating, amphibious house or the wet-proof house. These modern reinterpretations of the traditional construction retain the basic principles of mitigation against flood damage, such as incorporating waterproof floors, elevating electricity plugs and relegating essential functions to the upper floors (Nillesen 2014). The concept of local disaster culture, namely seismic and flood, will inform the research and analysis of the two case studies described in chapter 5. This will address one of the research objectives, providing a narrative of how the two historic centres have historically adapted to the risk.

2.3 Intangible disaster culture

As outlined in section 2.2, the risk culture is not only manifested in the physical component of a traditional building but is also related to aspects of human behaviour and spiritual practices. These practices are part of the intangible cultural heritage of a community. Article 2 of the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (2003) defines intangible culture as:

> The practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognise as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity.
>
> (UNESCO 2003, art 2)

This definition can be extended to the intangible culture locally developed in an area at risk drawing on local traditional knowledge. We can see instances of this local knowledge in many different cultures and environments. As demonstrated in the examples that follow, this intangible knowledge can have concrete outcomes (i.e. water management) or can develop beliefs and legends that ensure the safety of a community. Recent geoarchaeological studies in East Africa (Lang and Stump 2017) highlight how resilient agricultural practices in the past helped the local community to adapt to the changing environmental condition. The analysis of the soil of the terraced landscape at Engaruka (Tanzania), dated from the 15th-18th century AD, shows that the farmers have developed an ability to manage the flooding water to irrigate and fertilise their plantation. This important archaeological investigation provides concrete evidence of sustainable and resilient agricultural methods that formed a community's local disaster culture in terms of learning and

adapting to live with the flood events. A similar example is provided by Suleman during a lecture organised by ICCROM (2020). He describes how traditional communities along the Nile have exploited the flood events to create a vast irrigation system to support their agriculture production. Indeed, the agriculture calendar was following the flood time allowing the water to access a system of ditches created for the earth's fertilisation. Unfortunately, in 1964 the Egyptian state took control of the river Nile's water management, altering the natural flood cycle. This resulted in the fragmentation of the local agriculture community and the irreparable loss of their culture. This example of local intangible risk culture demonstrates the close relationship between traditional knowledge and the local identity of a community.

African indigenous communities offer another example of intangible risk culture that has developed traditional risk management strategies based on taboos and beliefs to protect the biodiversity of an area. By discouraging deforestation in some vulnerable regions through storytelling, the indigenous communities prevent soil erosion and preserve the water catchment areas. In this way, the risk of disaster is reduced (Kiriama 2006, 88-95). Knowledge of the geographical context and changes in the climate are essential for developing an intangible risk culture, as has been shown by the Moken community in Thailand (Manas 2013, 30). This community of sea nomads survived the destructive tsunami of December 2004 thanks to their traditional knowledge of a legend, which tells of the seven waves which precede a tsunami. When they realised that the movement of the seawater was unusual, resembling those described by the legend, they climbed to the higher ground, helping others to find a safer place. Thus, the value and effectiveness of the traditional knowledge of the Moken community was publicised and acknowledged post-tsunami. While the use of local risk knowledge is critical to mitigate the effects of disasters, it has historically also been beneficial to the social and economic development of society.

Despite the pervasive technocratic approaches to disasters in western countries, it is also possible to find examples of intangible risk culture. Wenger and

Weller (1973, 5) noted the presence of a flood subculture in various cities of North America. One example is the city of Marietta (Ohio), defined by its citizens as a 'flood town'. Indeed, the high frequency of flooding has led the community to adopt methods that raise the awareness of tourists and new inhabitants to the risk of flooding, such as the use of watermarks in stores and hotels, flood seminars where the behaviour and procedures to follow during and after a flood event are explained. The study of McEwen and Jones (2012) into community flood resilience planning after the 2007 flood in the UK highlights the importance of incorporating local flood knowledge into policies and flood management strategies. Their study found that residents exposed to flood risk build an empirical knowledge of all the elements that make up the hydrology of the area in terms of:

> Qualitative or quantitative terms a whole gamut of physical hydrological parameters including antecedent conditions to floods, their causes and response times to rainfall, intensifying factors, flood size and frequency, speed of onset, duration, relative velocities, spatial extent and pressure points, water quality - their unfolding processes and interactions, and local physical/human impacts.
>
> (McEwen and Jones 2012, 679)

The recognition of traditional knowledge of risk factors and mitigation practices is essential for conserving local values and therefore built heritage. The above quote highlights the benefits of incorporating intangible risk knowledge to reduce the impacts of disasters. This implies creating a solid partnership between people and the local and national institutions in sharing and protecting local traditions and knowledge.

2.4 Culture and Resilience

Using the concept of ‘culture and resilience’ to understand and manage risk is a relatively new approach and has developed to describe how a system prepares for, responds to and recovers from an external hazard. This refers to the radical change

in orientation which brings traditional knowledge and cultural elements into the risk reduction policies. While the early approaches to Disaster Risk Management (DRM) were characterised by a technocratic and hierarchical response to an external risk, in other words, the focus was on the knowledge of the hazard, its causes and vulnerability to potential impacts, recent approaches have focused on the community and on grassroots activities which introduce the concept of resilience (Cardona 2003). This represents a significant shift towards what is known as 'resilience thinking' (Folke et al. 2010). This overarching concept will be further explained in section 2.6. Here, it is essential to highlight the shift in perception and interpretation of risk that has refined the disaster paradigm over the past three decades.

This paradigm shift is evident in the change of the emphasis on the agendas of the International Decade for Natural Disaster Reduction (IDNDR) (1990-1999) and the Hyogo Framework for Action (HFA) (2005-2015). Although the first document was crucial in proposing the first international debate about DRM, it considered natural disasters to be extraneous to human activity advocating technical solutions and monitoring as the only viable ways of dealing with them (Cannon 1994). The HFA, however, as previously stated, aimed to enhance community resilience through educational programmes promoting more participatory and consultative action. The theoretical understanding of the two programmes has undergone a significant shift which has seen the concept of resilience adopted as a more holistic approach, which integrates both physical (built and natural) and socio-political aspects. Recently, the Sendai Framework (2015-2030), which builds on the HFA, has introduced, for the first time, the protection of cultural and environmental assets in the main goals for disaster risk reduction. By promoting a people-centred preventative approach, the importance to enhance buildings' resilience is underlined. This new policy uses the slogan "Building Back Better", in which the concept of adaptation is embedded.

In the post-disaster recovery, rehabilitation and reconstruction phase, it is critical to prevent the creation of and to reduce disaster risk by

> "Building Back Better" and increasing public education and awareness of disaster risk;
>
> (UNITED NATION 2015, Principle k)

Despite a different emphasis, these international policies shared a common terminology that is crucial in DRM, namely 'vulnerability' and 'resilience'. The theoretical understanding of these two concepts, and their often dichotomous relationship, is key to assessing the risk of urban areas. Based on the current theoretical literature, the following discussion will present the various definitions of the two concepts in relation to the conservation of cultural heritage subject to natural hazards such as floods and earthquakes. In addition, vulnerability and resilience assessment methods are described to provide the literature background that frames the research question (see section 1.4).

2.5 The role of Vulnerability in Disaster Risk Management

There are various definitions of vulnerability, depending on the research area and the historic period in which this concept has been investigated in the literature (Birkmann 2006, 11). However, the concept of vulnerability was firstly theorised within the social science field in the 1970s as a response to the purely hazard-oriented approach to disaster. With the introduction of the concept of vulnerability, the focus on avoiding risk using a technological defensive infrastructure gradually shifted towards the analysis of the various vulnerabilities in a given context. In his analysis of vulnerability, Cannon (1994) describes this novel approach for risk mitigation as people-centred rather than hazard-centred due to a new interest in reducing the impact of the hazard through enhancing people's preparedness. According to Cannon, vulnerability is related to the presence of an external risk and depends on people's access to resources and the strength of their livelihoods.

The most accepted definition of vulnerability was formulated by UNISDR (United Nation International Strategy for Disaster Reduction) which defines it "as the

conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards" (UNISDR 2009, 16). This definition underlines that vulnerability results from the interaction of social and physical conditions with an external risk. While it is possible to improve the social condition in an area at risk by building capacities and enhancing community knowledge, the structural response is proposed to decrease the vulnerability of the built environment in terms of infrastructural strengthening. However, the current scientific and academic debate encourages the integration of these two aspects. The traditional techno-centric approach, which only considered the physical damage and condition of the buildings to express the potential for damage and fabric loss in an objective way, should consider the other dimensions that constitute and drive vulnerability (UNISDR, 2009).

2.5.1 Vulnerability assessment

Vulnerability is embedded in the concept of risk and its identification, assessment and ranking and is crucial to mitigate and reduce the impact of natural hazards. Indeed, the equation formulated by Blaikie in the seminal volume entitled *At Risk* (Blaikie 1994) describes vulnerability as one of the two components that produce risk, namely: Risk = Hazard x Vulnerability. Therefore, vulnerability is used to better understand the causes of risk and mitigate its impact. In the same way, my research proposes a resilient assessment that looks at the system positively, focusing on the capacity for responding to a hazard.

However, there is a lack of systematic procedure to measuring and assessing vulnerability, depending on the various analytical concepts and models of how the vulnerability is theorised, which emphasise various aspects of it in relation to hazards, causes and contexts. Birkmann (2006, 40) provides an example of classifying the diversity of approaches from different disciplinary standpoints. These methods range from considering vulnerability as a pre-condition of the system to embracing a more holistic approach to a vulnerability assessment that considers socio-economic and environmental conditions as root causes. Despite the different

focus of these theoretical schools, vulnerability is considered an intrinsic condition applied to various elements such as social groups, structure, ecosystem, and services. Similarly, in his PhD thesis, Jigyasu (2002, 42) summarised the different frameworks of vulnerability analysis as the techno-centric, target group, situational or community. Each approach underlines the vulnerability of various elements such as physical, social, ecological and human, and is related to the changing paradigm of DRM discussed earlier. Both authors recognise the importance of these frameworks in order to analyse vulnerabilities within a shared cluster. Moreover, they provide a rationale to measure both qualitative and quantitative aspects of vulnerability through indicators and the selection of criteria. To assess the vulnerability in a specific area or context, it is essential to identify those factors or variables that make a system vulnerable (Pelling 2003). Birkmann (2006) emphasises that vulnerability assessment is crucial in the practical decision-making process to deal with hazards. This assessment method is based on the use of indicators used to compare and quantify vulnerability in different contexts. The indicator is defined as:

> A variable which is an operational representation of a characteristic or quality of a system able to provide information regarding the susceptibility, coping capacity and resilience of a system to an impact of an albeit ill-defined event linked with a hazard of natural origin.
>
> (Birkmann 2006, 57)

It is important to emphasise that the indicator can be qualitative, quantitative or represent a rank variable (which express a position i.e. “first”) but its value does not influence its significance. Birkmann (2006) explains that clarifying the scope of the assessment is necessary to develop an indicator. Furthermore, the choice of indicators should be based on the quality criteria such as measurability and relevance in terms of policies and representing an issue that is important to the topic. These criteria represent general guidelines that can apply to various research fields in a flexible way. Indeed, as discussed in section 2.6.2, the quantitative resilient

assessment also uses the same criteria. Thus, depending on the approach, the researcher should prioritise the criteria to represent better the various aspects of vulnerability in its qualitative and quantitative aspects.

2.5.2 Vulnerability assessment in the historic built environment

According to Oxfam International (2021), climate-related disasters have tripled in the last 30 years. Consequently, also the historic built environment is increasingly threatened by natural hazards. Studies of this vulnerability concentrate on the damage or resistance of a historic building's fabric to an external shock. In this section, a specific vulnerability assessment developed in areas exposed to flooding will be examined. This is significant in this research as it will provide the basis for the proposal of an alternative resilient framework described in chapter 6 (section 6.6) for the York case study. According to Stephenson and D'Ayala (2014), the approach to assessing flood risk shifted from a more preventative method, which includes the design of standard flood defences as primary outcomes, towards a broader perspective of flood risks, which involves local authorities and governmental organisations in the management of the flood basin and landscape. Traditional approaches to assessing the built heritage vulnerability use quantitative analysis based on the estimation of direct and indirect flood damage. An example of direct damage is the detrimental effect caused by the floodwater and the fabric loss, whereas the post-recovery process is considered indirect damage.

D'Ayala noted a lack of research in the literature relating to estimation methods of historic buildings' vulnerability to flooding. The recent upsurge in interest from international organisations and scholars (NOAH'S 2004; Drdácký 2010) into the protection of historic centres to the increasing number of flood events has been concerned with the larger urban context. However, in the development of vulnerability analysis at the building scale in relation to the physical damage and material loss as a result of a flood event, the method used for the PARNASSUS project conducted by University College London (UCL) stands as a unique example. For this project, a new methodology was proposed to assess the vulnerability of

historic buildings to flooding according to their form, structural and fabric preservation, and architectural and archaeological values (Stephenson and D'Ayala 2014, 1035). The buildings were classified according to seven descriptive parameters or indicators, namely: age; listed status; use; footprint; number of storeys; material and structure; and condition; and assigned a vulnerability ranking (VR) from 10 to 100. These indicators aim to depict the inherent vulnerability of the historic buildings in relation to their typology and tangible (e.g. material) and intangible (e.g. attributed cultural values) aspects. This approach is considered relevant for this study as it focuses on the building elements, providing a specific and detailed analysis of all the building's components that can enhance embedded vulnerabilities. It constitutes a valuable example of analysis at the building scale, which can be adopted to the York case study.

2.6 The role of resilience in Disaster Risk Management

This section explores the relationship between vulnerability and resilience within the cultural heritage and environmental hazard field. It is necessary to clarify the often-contradictory definitions of vulnerability and resilience. These terms are considered in the literature as either coinciding or complete distinct concepts (Manyena 2006, 440-441). The term resilience has been introduced into the disaster field only in the last decades due to the actions of the HFA. It has become increasingly predominant in research and studies, especially in climate change adaptation and risk response. However, as discussed in the introduction, resilience is still an evolving concept which is employed in different fields and assumes multiple meanings. Firstly, the theoretical evolution and understanding of resilience thinking are illustrated, and then different frameworks to assess and quantify it are explored. Given the wide range of definitions of resilience in the literature, only studies relevant for the built cultural heritage field in relation to the DRM have been selected for the following discussion.

The Latin meaning of the word resilience, *resi-lire*, is 'jump back' or 'bounce

back', referring to an object returning to its original condition after sustaining external stress. In 1973, the theoretical ecologist, Crawford Stanley Holling, was the first to introduce the notion of resilience in the field of ecological science. Since then, the concept of resilience has become popular in several disciplines, increasing the ambiguity of its meaning and the difficulty to establish a single framework for its analysis. In this thesis, I will draw upon the theorization of resilience proposed by Holling (1973), as it is influential for both built heritage and the society developed around it. Referring to the seminal work of Holling, Bosher (2008, 12) points out two significant branches of resilience. The first focuses on the efficiency, control and predictability of a system after an external shock. This aspect, defined as 'engineering resilience', is the ability of a system to return to an equilibrium or steady-state after a disturbance. Therefore, it implies only a global equilibrium that guarantees optimal performance and safe design.

In contrast, the second branch refers to the ecological, evolutionary, or developmental perspective, highlighting the aspects of variability, adaptiveness, and persistence. Holling defines the measurement of the ‘ecological resilience’ as: "the magnitude of disturbance that can be absorbed before the system changes its structure by changing the variables and processes that control behavior" (Holling 1996, 33). While engineering resilience emphasises the role of resistance to an external hazard to bounce back to the original state and an only state of equilibrium, the ecological perspective implies different equilibria. In this perspective, a system affected by a disturbance is not limited to a single cycle but rather in multiple adaptive cycles. The adoption of the ecological perspective defines the novel approach of ‘resilience thinking’. Folke et al. (2010) illustrate three fundamental aspects of a resilient social-ecological system: persistence, adaptability, and transformability. According to Folke et al. (2010), the last two are requisites of a system to persist, embracing the change, that are essential components of resilience:

> Adaptability is part of resilience. It represents the capacity to adjust responses to changing external drivers and internal processes and allow

> for development along the current trajectory (stability domain). Transformability is the capacity to cross thresholds into new development trajectories. Transformational change at more minor scales enables resilience at larger scales.
>
> (Folke et al. 2010, 19)

From the point of view of resilience, the main difference between adaptation and transformation is the trajectory shift of a threshold level of a control variable in a system. Walker et al. (2004) provide a broad definition of threshold as a breakpoint between two regimes of a system. Therefore, adaptation is a change that occurs within the same threshold level, whereas a transformation takes place across different thresholds. The central idea of resilience thinking is that social and ecological systems are interdependent. This relationship can be extended to cultural heritage as it intersects the human and natural environment and results from human activity. Indeed, Harvey's premise (2001, 2) is "that heritage has always been with us and has always been produced by people according to their contemporary concerns and experiences". That is why to assess and describe the resilience of built heritage it is crucial to consider their social and environmental context. Furthermore, to manage and adapt change in the conservation field, built heritage should be considered as a dynamic system continually evolving as the social and ecological system.

After defining several interpretations of resilience, it is necessary to position it in relation to vulnerability by highlighting their epistemological differences. Crucial to this is Manyena's (2006) study, which contributes to the paradigm shift in disaster risk reduction focusing on the proactive role of resilience. His research outlines the various positions in the literature that have contributed to developing the concept of resilience in the disaster risk reduction field. Disaster resilience can be described as a 'shield' or 'shock absorber', which mitigates against the negative consequences of a disaster. Indeed, the main objective of DRM is to guarantee the minimal loss of life and livelihoods and to allow the affected community to recover in the shortest

possible time. First, Manyena noted that resilience is defined in two ways: the desired outcome or a process leading to an outcome. However, resilience is commonly seen as an inherent capacity or quality that can be increased (Özel et al. 2014). He discourages adopting outcome-oriented resilience programmes as they are more rigid in the structure being inclined to preserve the status quo. Manyena prefers the definition of resilience as a process in which humans are recognised as being able to promote a series of events, actions or changes in the face of an adverse event. In this interpretation, resilience is compounded with the notion of adaptation. Post HFA, Manyena (2015, 15) emphasises that the focus of future policies and decisions should be to address the bounce-forward ability of resilience instead of the bounce-back ability. This would encourage actions towards a more creative scenario of opportunities and solutions. Resilience, concludes Manyena:

> Could be viewed as the intrinsic capacity of a system, community or society predisposed to a shock or stress to adapt and survive by changing its non-essential attributes and rebuilding itself. This definition has consequences for disaster risk reduction and development practice.
>
> (Manyena 2006, 466)

The philosophy behind this definition, drawn upon the UNISDR definition of resilience (2009, 24) in which the ability of adaptation without compromising the original function or values of cultural heritage is emphasised. Therefore, central for this research is the bounce-forward ability of resilience, focusing on the creative process of adaptation of a cultural system from an architectonic and community perspective. However, whether resilience is an intrinsic element of cultural heritage is questioned and contributes to the research inquiry of this thesis.

2.6.1 The resilience in the historic built environment

In recent years, in response to the effects of climate change on urban assets, the concept of urban resilience has been introduced in both academic and policy discourse, becoming an important goal for cities and urban areas. Meerow et al.

(2016) examine the different perspectives of urban resilience within the literature of the past two decades. They aim to clarify the ambiguity within both concepts of 'urban' and 'resilience'. Given this inconsistency in the literature, Meerow proposes a flexible and inclusive definition of urban resilience which:

> Refers to the ability of an urban system-and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales-to maintain or rapidly return to the desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current and future adaptive capacity.
>
> (Meerow, Newell and Stults 2016, 45)

This definition implies the complexity of an urban system in its social infrastructural, and economic aspects. The timescale of recovery is an essential component that determines the degree of resilience of an urban asset (i.e. more rapid recovery is more resilient). Another aspect to consider is that resilience is a dynamic factor that allows changes and adaptations in different contexts adopting a multi-equilibrium approach. While the debate about urban resilience in terms of communities, institutions, and the natural and infrastructural environment has been widely explored, albeit with some contradictory theoretical outcomes, there are some challenges in applying resilience to the built heritage. The cultural built heritage is not a passive resource exposed to natural disasters: it also plays a proactive role in improving the resilience of the local communities and vice versa (Jigyasu 2005b) due to its tangible and intangible values.

MacKee et al. (2014) applied Holling's theory of adaptive cycle for ecology to the cultural built heritage. It consists of four key phases: growth or exploration; conservation; collapse or release; and reorganisation. The collapse or release leads to a phase of transformation induced by a disaster. As discussed above the timescale of recovery is an essential feature, indeed resilience is considered in the adaptive cycle as a third dimension that accelerates the phase of reorganisation in

which, in the case of built heritage, the recovery process can be identified. According to MacKee et al. (2014), the cultural built heritage as a category of the built environment is related to the socio-ecological system. Therefore, it is possible to conceptualise the adaptive cycle that supports a more holistic and integrated approach to conservation within DRM. Interestingly, Davoudi (2012) points out that resilience is closely connected to the notion of innovation and transformation within the ecological approach. He explains that while the system is experiencing great uncertainty during the reorganisation phase, innovation can transform a crisis into an opportunity. Similarly to Manyena (2015), resilience is described as an element that stimulates the creativity of a system during the adaptation process. In his work, Davoudi explores the concept of resilience applied to urban planning. Firstly, he uses ecological or evolutionary resilience to understand the notion of place as a complex social system, including the contextual condition's uncertainty. Therefore, planning is seen as a flexible tool to shape the urban context. Davoudi's view of resilience as a dynamic and adaptable element powerfully resonates with my study in relation to historic settings' reconstruction process after a hazard. This definition of resilience challenges the initial state of a system, both in terms of community or buildings, finding creative and innovative new solutions to improve the original condition.

According to Leitaõ (2018), the first application of resilient thinking in the heritage field was limited to persistence based on an approach that is 'backwards-looking' in other words, that avoid change. For this reason, in the following chapter, the evolution of conservation policies is explored in relation to the concept of resilience, highlighting how the new understandings of heritage are intimately related to resilience thinking. Enhancing the resilience of the built heritage is the objective of current international policies and programmes, such as the 'Venice Declaration on building resilience at the local level towards protected cultural heritage and climate change adaptation strategies' (UNISDR 2012). This declaration promotes activities to raise awareness and encourage collaboration among various stakeholders such as local governments, disaster managers and heritage specialists. Indeed, the concept of resilience refers to a system's capacity, in this

case, a building, to avoid or resist damage by implementing structural measures, recovering quickly after a natural hazard, and adapting to an uncertain future (Gersonius 2008).

2.6.2 Resilience assessment

As discussed in the previous sections, the concept of resilience has increasingly become prominent among international and local guidelines and policies related to environmental issues. However, while the theory concerning resilience has been implemented since the 1970s, the way to measure and assess it through objective indicators is a new and on-going research field. Indeed, a wide gap exists between the theoretical approach to resilience, included in numerous policies and guidance (Hyogo Framework for Action, Horizon 2020), and practice in the field, and no consensus exists currently on how to measure resilience (Winderl 2014). This is due to the diverse and contrasting definitions of resilience that depend on its understanding developed in various disciplines. Similarly to vulnerability assessment, measuring resilience is a valid tool to protect the built environment. This method can identify issues, improve and monitor them, assist heritage organisations or building owners in developing and prioritising interventions (Burroughs 2017). Within the broad literature in assessing resilience methods, only selected frameworks developed regarding socio-ecological and engineering-urban studies have been analysed as relevant for this study.

A significant study by Bahadur et al. (2013) provides a systematic analysis of the literature concerning 43 resilient assessment frameworks. Interestingly, he observes that most of these frameworks are based on the theoretical assumption of the adaptation capacity of resilience or external shock absorption. This shows an alignment of the measurement methods to ecological or evolutionary resilience, highlighting the importance of the 'bouncing forward' characteristic previously described. Another finding demonstrates that these frameworks can be used only at the local/community level, denoting a gap in the application at the national level. It suggests that the condition and understanding of resilience are intimately

connected with the contextual conditions that include the community's attributes, for example, in terms of wealth, coping capacity and behaviour, protection, security. Finally, Bahadur differentiates resilience assessment approaches that use quantitative or qualitative measures, noting that within the framework analysed, a large number refers to the quantitative approach. While the latter uses resilience indicators to which is assigned a numerical value, a qualitative approach to measuring resilience provides an understanding of resilience characteristics to guide the elaboration of policies and research.

The use of indicators to measure the resilience of a system reflects the same methodological approach used for the vulnerability assessment discussed above in section 2.5.1. According to Schipper and Langston (2015, 12), the most important aspect is the credibility of the information rather than the volume of data within the criteria already described. Their study is based on the systematic literature review provided by Bahadur et al. (2013), focusing on using indicators across different resilience frameworks. In their comparative analysis of theoretical resilience frameworks, Schipper and Langston (2015) classified practices of measuring resilience in the context of climate change and natural hazards through various indicators. The frameworks included in the analysis refer to the indicators adopted to measure a community's resilience of livelihoods and cities, which are used to monitor and evaluate the outcomes of a project and are closely related to the theoretical framework in which they are developed. Interestingly, they highlighted that the selection of indicators is based on the theoretical definition of resilience. This represents a challenge in comparing data between different contexts and case studies, as the understanding of resilience can differ according to the local experience. Another disadvantage is the scientific nature of the method in terms of issues related to the measurement's time dimension, as it provides just a 'snapshot' of resilience that can vary over time. Indeed, time, as an indicator of resilience, should be considered not only during the recovery or reorganizational phase of a system but also implies an understanding of resilience over a long period. This will provide an overarching view about the resilience behaviour of a system in terms of

how it coped with different external disturbances.

Despite the limitation of a quantitative assessment of resilience, various studies respond to the urgent need to elaborate methods able to represent the resilience of a system. To assess flood impact in urban areas, Hammond et al. (2015) identify two broad techniques to quantify resilience in terms of direct and indirect methods. The direct methods focus on how the system responds to extreme events, whereas indirect methods use indicators to explore the dimension of resilience in terms of social, economic, institutional, infrastructural and community aspects. In the structural and engineering field, one of the most significant studies on resilience assessment, using a direct and quantitative method, is provided by Bruneau et al. (2003), outlining measurable criteria to reduce and mitigate the impact of a disaster. Bruneau is interested in analysing the resilience of communities affected by a seismic event. He considers the 'bouncing back' characteristic of resilience for both physical and social systems. Based on this definition, he distinguishes the 'technical', 'organisational', 'social', and ‘economic' dimension of resilience. This highlights the complexity of providing an overall measure of resilience and the necessity of interrelating the four dimensions. Finally, Bruneau provides four resilience characteristics, namely robustness, rapidity to recover, resourcefulness and redundancy. He points out that the first two criteria, robustness and rapidity, are the most important in the overall assessment as representing the 'product' of resilience, whereas redundancy and resourcefulness are characteristics that help to enhance it. The role of redundancy, in terms of the extent to which elements are substitutable, is important in the event of a system crisis. The quantification of resilience in Bruneau’s study aims to reduce failure probabilities and reduce consequences from failures in lives lost, damage, and adverse economic and social consequences and reduce time to recovery.

However, in Bruneau’s resilient assessment, the resistance of a system is emphasised rather than its adaptability capacity. Thus, his study appears limited to a technological and structural approach that cannot translate cultural heritage

complexity. In contrast, few studies have focused on assessing the resilience of the historic built environment at the building scale, preferring the city's analysis conceived as a whole. An example is provided by The City Resilience Framework (ARUP 2013), which is based on four dimensions of resilience (health and well-being, economy and society, leadership and strategy, infrastructure and environment). The indicators are defined by the outcomes of the actions to build resilience in each category described (such as: Diverse livelihoods and employment, Social stability and security, Empowered stakeholders), providing a holistic interpretation of the resilience in an urban environment. Through the case study of York and Amatrice, the research will address the literature gap to assess resilience using mixed methods of analysis and visualise the results in 'resilience maps', using GIS software in a participatory way.

2.7 Conclusion

The above discussion highlights the complex relationship between the culture(s) of a specific place and the threat of natural disasters to its built heritage. The continuity of a historic centre is the result of a dynamic process of community adaptation to different environmental conditions through material elements as well as behavioural practices and knowledge: in fact, there is typically a blend of tangible and intangible cultures of risk in areas subject to natural disasters such as floods, earthquakes and tsunamis. Bankoff (2015, 67) argues that an effective Disaster Risk Reduction process should encourage a community to rediscover and put into practice their own traditional knowledge relative to the risk they face. In developed countries, traditional approaches used in seismic or flood-prone areas were based on the use of flexible materials that allowed for the movement of the structure and the use of porous material. However, modern approaches tend to use more rigid materials and construction techniques that, as demonstrated, cannot be applied to historic buildings as they have been proved to be detrimental to the integrity and authenticity of the building.

Both tangible elements of disaster culture, namely traditional constructive techniques employed in areas at risk, and intangible elements, such as the collective memory and local traditions of various communities which deal with risk, have been discussed. The impact of research concerning local seismic culture within the conservation process in seismic areas (Ferrigni 2005) has also underlined the importance of identifying elements that form the disaster culture of a place to increase the resilience of a building. This has led to a significant understanding of the locally-evolved building traditions that historically coped with the threat of floods and earthquakes. It is envisaged that the recovery of the local flood culture could preserve the significance of the place and decrease its vulnerability to future flooding events, helping to engage the community and enabling conservation experts to conserve the historic fabric of the building and reproduce traditional features which had been damaged.

The second section of the chapter introduced the concept of resilience in relation to vulnerability within DRM and built heritage. By defining these two notions, it is possible to trace the development of various approaches used to manage the built environment in an area at risk. While the introduction of the vulnerability analysis opened the research up to a broader perspective, including social, economic and political aspects as elements that contribute to risk exposure, the concept of resilience confers a proactive approach to risk mitigation focusing on local and inherent capacities. However, Maneya (2005) has defined the relationship between vulnerability and resilience as separate but closely connected themes. By comparing the two terms, it has emerged that the study of vulnerability is mainly focused on the situation preceding a disaster. In other words, it considers the exposure and the sensitivity of a system to a hazard. In contrast, resilience is analysed during and after a disaster in terms of recovery and response.

Vulnerability is associated with the measure of risk, expressing the degree to which a system reacts to an external shock. Cutter et al. (2008) refer to vulnerability as an inherent characteristic of a system in the phases before the disaster. On the

other hand, resilience, while also being embedded in a system, can respond, learn, and change, enabling significant damage to be avoided. Moreover, the concept of resilience, which is connected to the adaptive cycle of a system and emerged from the field of ecology, refers to the capacity of a system to respond and overcome its vulnerabilities in a creative and innovative way (Davoudi 2012). Therefore, resilience is defined in terms of threshold and equilibrium shifts of a system in an adaptive and transformative way (see Folke et al. 2010), whereas vulnerability refers to structural changes.

Despite the growing importance of resilience in the DRM field, it is seen as challenging to quantify it in relation to the built environment exposed to natural hazards such as floods and earthquakes. In contrast, as shown earlier, the vulnerability assessment is a reliable tool traditionally used to mitigate risk. Few studies assess resilience at the building scale, using indicators as a tool to measure and compare resilience. In this study, a resilient assessment using quantitative and qualitative approaches is proposed, as explained in the methodology chapter. This offers a representation and assessment of resilience that aim to overcome the gap between the theoretical framework and the practical application of the concept.

3. A bridge between conservation values and resilience

This chapter interrogates the relationship between the new value-led conservation theories developed in the last two decades and the resilience discourse that emerged from the DRM field (discussed in chapter 2). In the first part of this chapter, the notion of resilience is critically linked with heritage values -in their tangible and intangible aspects- via understanding the role of tradition in sociological and architectural theories. The discussion begins with the historical evolution of conservation charters and guidelines, focusing on the shift from the 'intrinsic' (de la Torre 2013, 155) and material values of heritage towards their social and cultural dimension. This 'social shift' had a significant impact on conservation approaches and methods, as a more participatory process is required to understand the multiple values of heritage. A final reflection is cast on the impact of participation in cultural heritage reconstruction practices after sudden destruction caused by a natural or human-made disaster.

This historical excursus through the changing values of heritage lays the foundations for the theoretical development of this chapter's main argument, establishing a connection between heritage values and resilience through tradition. Drawing on Marx's theories of history (1852), it became apparent that the notion of tradition, as linked with the past, can acquire a negative meaning because it is deprived of the critical awareness of contemporary society. By comparing Marx's (Barhrick 1984) vision on modernism with the Ruskinian tradition (Swenarton 2014; Wheeler and Whiteley 1992), it is possible to identify the role of tradition as an agent of continuity between the past and the future. The same vision of tradition is shared by post-World War II Italian architects such as Pagano and Rogers. They challenged

the early modernist theoretical critiques of history, re-evaluating the significant role of vernacular architecture to develop a new architectural language.

After highlighting the connection between continuity and tradition through the critical selection of cultural values, a parallel is then established with the notion of resilience as an embedded characteristic of historic buildings that allows change. The second section of this chapter explores the promotion of participatory approaches in various cultural heritage disciplines such as architecture, urban planning and DRM. The reference to the first participatory design projects in the 1970s is crucial to understanding the vibrant cultural context that led to the development of novel methodologies. Among these participatory methods, the use of maps in heritage, namely cultural mapping, is argued to be an effective tool for this research as it combines social science methods with the humanities, using geospatial technology to assess heritage values.

3.1 Moving from the intrinsic values of cultural heritage

To better understand the current conservation approaches in relation to natural hazards' threats, the following discussion on the historic development of conservation values focuses on their theoretical understanding. The seminal research of the Getty Conservation Institute on 'Values of Heritage' (1998-2005) provides, through a significant selection of case studies and reports, a connection between traditional values namely aesthetic and historic with contemporary ones such as social and economic. A value is defined by Mason (2002, 7) with a double meaning: as moral principles that guide individual or communal actions, and as a positive characteristic which determine the significance of cultural heritage. However, within the values classification, there is a critical contraposition between historic and aesthetic values which are embedded in the physical representation of the heritage with social and cultural values that reside beyond the material fabric. The origin of conservation theory is founded on the aesthetic and historic values, influenced by the antiquarian interest in the authentic and original material.

Jokilehto (2012) and Glendinning (2013) widely discuss the differences between restoration in Italy and France and conservation practices in England through the contraposition of crucial figures such as Viollet-le-Duc John Ruskin and William Morris. Different approaches to the historic monument are dictated by the different understanding of history and the consequent representation of its value. The philosophical milieu of the late nineteenth century is characterised by the prevailing interest, post-Enlightenment, towards the definition of an objective framework of values to measure reality. The introduction of classes of values in the conservation discipline draws on the positivist interpretation of reality. The first attempt to identify a set of cultural heritage values is referred to the work published by Alois Riegl entitled *Der moderne Denkmalkultus* (1903). Riegl responds to the need to reorganise the Austrian conservation services laying the foundation of the modern restoration theory, emphasising the importance of the creative and artistic impetus as representing a specific historic period (Jokilehto 1999, 215). According to Hayes (2019), Riegl integrates the contemporary philosophical and historical theories of his time, to support the preservation of monuments against the radical restoration that was increasingly spreading in Europe. While Hayes points out that the primacy of age value relates to Ruskin's ideas on the aesthetic appeal of age that were popular in the Austrian cultural circle, the ideas of Riegl also resonate in Cesare Brandi's Theory of Restoration (Brandi 1963), which had an extraordinary impact on the development of international guidelines for conservation such as the 1964 Venice Charter (Jokilehto 2012, 237). Indeed, Brandi's work is based on the dual attributes, aesthetic and historical, that are integrated to form a whole with potential unity of the art object. The Venice Charter elicits these values in article 9 explaining the purpose of restoration interventions in the context of post-war reconstruction:

> It aims to preserve and reveal the aesthetic and historic value of the monument and is based on respect for original material and authentic documents.
>
> (ICOMOS 1964)

De La Torre (2013, 155) describes these values as 'intrinsic and self-evident' and limited to the monument's Eurocentric notion and its physical preservation. The Venice Charter's prescriptions embodied a predominantly Western perspective of conservation practices resulting in a narrow-focus on the material issues. Evolving international charters and guidelines through the twentieth century enhanced the concept of heritage, including tangible and intangible aspects, recognising minorities and indigenous groups' cultural values. The 1979 Burra Charter (ICOMOS Australia), updated in 1999 and 2013, and the UNESCO's Nara Document on Authenticity in 1994, revisited in 2014 (ICOMOS 1994), constitute crucial documents that lay the foundation for the values-based approach, emphasising the importance of cultural diversity in relation to the concept of authenticity and significance. The tangible and intangible aspects of cultural expressions are equally emphasised, accepting a fluid understanding of authenticity that is no longer confined to the original material or fabric, incorporating the plural meaning connected to different cultures. Furthermore, these documents move from a Eurocentric and colonialist position by replacing the concept of monument with the notion of "place" (Ireland et al. 2020). The centrality of assessing significance through values is especially emphasised in Historic England's Conservation Principles (Historic England 2008). The text provides a set of categories, including communal value, to describe, in a systematic way, the values of cultural heritage. Therefore, in contrast with the rigid set of values portrayed in the first conservation charters, many researchers (Mason 2006; Pereira 2007; de la Torre 2013) argue that the current values reflect a new understanding of relativism in heritage work and its role as a social process. The conservation practice is increasingly viewed as an ‘engine to change', values of heritage are dynamic and attributable, requiring flexibility depending on the cultural context.

In recent years, values-based approaches have been subject to critiques (Smith 2006; Poulios 2010; Walter 2014; Fredheim and Khalaf 2016) as dominated mainly by specialist assessment. For example, Walter (2014, 636) in his study on religious heritage in England argues for an alternative narrative approach to historic

buildings to facilitate the communication between expert and non-professionals. Walter opposes the Lotze and Nietzsche positivistic interpretation of reality to the alternative phenomenological approach used by Heidegger. Despite their theoretical differences, for Lotze and Nietzsche, values are intended as abstracted properties to inform objects' meanings in terms of moral, aesthetic, and truthful characteristics. This conceptualisation of values provides a factual and objective description of reality where the value framework is used to measure the material world. By contrast, Heidegger refused the epistemological interest of philosophical issues characterised by the dichotomy between the subject and its definition of the object. The human being (subject) for Heidegger is connected and involved with the structure of reality, given its meaning within it. This thinking underlines a relativism path in the conservation practice, where the social component becomes paramount in assessing the significance of cultural heritage. This relativism in heritage values is strongly in contrast with the authorised heritage discourse, which will be discussed further in section 3.3. In the Eurocentric discourse, values are considered static and inherent to the heritage, privileging the role of professional expertise (Smith 2006, 29-30). In the following section, social values are introduced as an integral element that fosters community participation.

3.1.1 Social values and participation

The growing inclusion of stakeholders' values and perceptions in conservation practice underlines the importance of participatory activities for heritage protection. Contemporary conservation practices are increasingly supported by sharing decisions between stakeholders rather than the imposition of preconceived, top-down expert judgement. Muñoz Viñas (2002) describes this paradigm shift, as the end of objectivism in conservation, proposing the notion of inter-subjectivism in place of the subjectivism, which implies individualism.

> Intersubjectivity is based upon agreements reached between-the-subjects. The subjects that are affected in any way, whether tangible or intangible, by a conservation process form commonalities of

> intersubjectivity.
>
> (Viñas 2002,30)

This thinking aligns with the development of a broader understanding of heritage values, discussed above (Manson 2006; Pereira 2007 and De La Torre 2013). Jones and Leech (2015) examine this social turn in the field in their extensive critical review of the social value in the historic environment, defined as:

> A collective attachment to place that embodies meanings and values that are important to a community or communities… It also accommodates forms of memory, oral history, symbolism, spiritual association and cultural practice associated with the historic environment.
>
> (Jones and Leech 2015, 6)

Despite the difficulty to integrate social values in legislation and policy, Jones and Leech (2015) highlight an increased use of new qualitative and participatory methods in the conservation management field to record and document intangible aspects of heritage. Accepting that the relationship between community and heritage is fluid and mutable, Jones (2017) argues that social methods combined with participative practices are the most suited to provide a thorough understanding of the social component. Similarly, Orbaşli (2017) challenges the static and rigid approach to conservation of the traditional charters in an era which requires adaptability and dynamic approaches. In other words, conservation should aim to manage a change process rather than an ultimate product, and facilitate the management of cultural heritage with a focus on enabling community participation:

> Community participation in the protection of cultural heritage results from the broadening remit of heritage and therefore local and personal identification with it, the adoption of a values-based approach giving a voice to a broad church of interest groups, and a gap created by the diminishing power of institutional players.

(Orbaşli 2017, 166)

The turn towards social value also reflects the influence of post-modern theories on heritage, where local culture plays a crucial role. Avrami (2009, 178) observes how conservation theory mirrors the dichotomy between local/grassroots and global/top-down agency in planning. She argues for fostering cultural relativity and pluralism, contrasting with established, normative global and neoliberal policies. Participation, as a tool for value-driven planning, centres local context and embraces alternative ways of conservation. Avrami's edited volume, from the Getty Conservation Institute (GCI) symposium (*Values in Heritage Management: Emerging Approaches and Research Directions*) (Avrami et al. 2019), foregrounds practices which integrate social values in heritage decisions and management. Social value plays a crucial role in an inclusive notion of heritage, including non-western perspectives, underpinning participation practices. The increasing interest in interdisciplinary collaboration between heritage practitioners with other disciplines such as in the environmental field is also relevant for this thesis. The GCI symposium's recommendations include the ambition to develop "values-based nature-culture resilience guidance". These broad concepts, such as heritage-values and resilience, are here entangled and respond to the need for more sustainable and inclusive practices of conservation.

3.1.2 The reconstruction dilemma

In this section, the various trends within the conservation field are analysed. These are discussed in terms of cultural heritage reconstruction approaches to understand the role of resilience in relation to traditions and values. Cultural heritage, threatened by natural hazards or armed conflicts, presents a challenge to established conservation processes and thinking. Historically, conservation theories and UNESCO cultural conventions responded to the issues related to the preservation of heritage sites and monuments. However, conservation attitudes change dramatically when the affected community requires urgent rebuilding. For example, in the aftermath of the Second World War, the destruction of major European cities'

cultural heritage significantly threatened their cultural identity. The conservation guidelines, drawn on the international charters of Athens (1931) and Venice (1964), were inadequate for the reconstruction of the urban area, due to their narrow focus on the issues of integrity and authenticity of the single monument. Glendinning (2013, 187) underlines this issue by stating: "the urgency and emotional force of reconstruction dwarfed the old-nit-picking restoration debates, as it necessitated recreation not just of cherished individual monuments but of entire cities." The scale of the destruction required new methods for immediate and extensive reconstruction. Therefore, the scope of conservation gradually extended, from the single monument's interest to include urban and rural landscape. The motto *dov'era e com'era* (where it was and how it was) invoked to support the reconstruction of the Campanile of San Marco in Venice, which collapsed in 1902 (Jokilehto 2012, 206), was used again for other monuments such as St. Trinita bridge in Florence and the historic centre of Warsaw.

Managing the threats to, and erosion of cultural heritage in the 20th century has provoked international focus and the production of two key documents by UNESCO for the protection of cultural heritage: The Hague Convention, in 1954 and the Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention) (WHC) in 1972 (Jokilehto 2012, 288). The notion of cultural heritage expands in meaning between the two conventions. The 1954 Hague Convention is anchored to the physical aspect of heritage defining cultural property as 'movable or immovable property of great importance to the cultural heritage of every people' (UNESCO 1954, Article 1). Whereas, the focus of the WHC was directed to creating a list of sites of cultural heritage which are considered 'Outstanding Universal Value' (OUV) and monitoring the risks to them. This includes both cultural property and natural areas, enhancing the concept of heritage. Smith (2009, 1) underlines the impact of the WHC on the development of international heritage policies that followed, especially the 2003 Intangible Cultural Heritage Convention (ICHC). The WHC advocates for a 'shared heritage of humanity' integrating cultural and natural heritage with OUV. However, despite the

broader definition of cultural heritage, the OUV is based on authenticity and integrity, which relies on the physical manifestation of the historic fabric. This attention to the material aspect of cultural heritage raised concern after the destruction of the historic fabric of a World Heritage Site (WHS), where it became problematic to retrieve the OUV of the cultural assets.

Some reconstructed world heritage sites, such as the Old Bridge Area of the Old City of Mostar in Bosnia and Herzegovina, in 2005, or the Tombs of Buganda Kings at Kasubi, Uganda, damaged by a fire in 2010, constitute notable exceptions to the precepts of the 1972 Convention (Cameron 2017). For assessing these cases, the UNESCO committee has focused on the intangible component of the heritage site, responding to the social-cultural and political needs for a reconstruction of the community affected. This position has been reinforced by subsequent policies, namely, the1996 Declaration of San Antonio (ICOMOS 2011), the Riga Charter on Authenticity and Historical Reconstruction (ICCROM 2000), the Convention for the Safeguarding of the Intangible Cultural Heritage (UNESCO 2003) and the Nara+20 Document (ICOMOS 2014). These documents emphasise the relationship between authenticity and intangible forms of heritage. In light of this, Khalaf (2017) highlights the need for a shift within conservation policies, in favour of a reconstruction capable of incorporating present values through a dialogue with the community. The *Guidance on Post Trauma Reconstruction in Cultural World Heritage Properties*, edited by the ICOMOS (2016) and the World Heritage Committee, represents recent efforts to update the Operational Guidelines of the World Heritage Convention (Rouhani 2017). This guidance aims to assess the impact of the disaster, both natural or human-made, and help develop reconstruction options, reflecting on the current notion of cultural heritage and authenticity. The sudden destruction of tangible heritage erodes the foundations of the social and ethnic identity as well the collective one, which is constructed around the monument:

> The continuity and livingness of many intangible forms of cultural heritage, like traditional knowledge and skills, craftsmanship, social

> practice and way of life, depends profoundly on people and their places.
>
> (Rouhani 2017, 42)

Thus, central to the reconstruction process is the understanding of both social and physical context. As will be discussed in more detail in the following sections, the notion of continuity is intimately related to the concept of resilience. This implies the acceptance and understanding of change within the cultural heritage, in its tangible and intangible aspects. Man-made disasters demonstrate a deliberate will to erase culture, identity and memory. Robert Bevan (2006, 12) discusses the concept of 'cultural genocide' elaborated for the first time by Lemik during the 1968 Genocide Convention. This concept considers the destruction of monuments and buildings as an attack on a community's identity and the values embedded in their places. According to Bevan, the process of conserving both meaning and memories attached to the built environment allow continuity with the past preserving local identities. He states:

> However, a continuity of successive experiences, setting down layers of meaning, can I suggest, result in an especially strong power of place –a psychogeography, an 'awareness' of the past (rather than an architectural avatar of a petrified spirit) that is dynamic, handed down by people rather than recorded on the very stones, and is specific to a particular historic and political context.
>
> (Bevan 2006, 28)

Central is the role of the social values which transcend the physical features of heritage. Bevan (2006, 164) points out that the famous case of the Bamiyan Buddha, deliberately destroyed by the Taliban regime in 2001, is not only an iconoclastic attack. Specifically, those statues were a symbol for the people of the Hazara area that opposed an unsuccessful resistance to the Taliban regime, resulting in their cleansing. The complex reasons behind the destruction of the Buddha statues and the connected community open a dilemma for the possible

reconstruction. Holtorf (2018, 5) provides a telling example of how the physical absence of a monument such as the Buddha statues, could trigger cultural resilience by embracing the changes. Indeed, he argues that the slavish reconstruction of the giant statues is a negation of the past and the attack that occurred. Conversely, absorbing the change by supporting educational and participatory activities that foster understanding the site and its history is an effective way to increase the local resilience (Holtorf 2018). These reflections on human-made destruction can be extended to all kinds of disasters that address the trauma of loss.

Participation approaches and grassroots activities were promoted by shifting the focus from physically-based reconstruction to cultural practices of adaptation and learning. The Timbuktu World Heritage Site reconstruction in Mali represents an early change in UNESCO's attitude (Cameron 2017). The mausoleums, severely damaged by a terrorist attack, opened a question for *whom* and *why* the reconstruction is addressed. In addition to the symbolic importance of the site, the local community, involved in the reconstruction process, preserved and recovered the traditional building techniques. The living dimension of heritage, introduced by the 2003 UNESCO convention for the Safeguarding of the Intangible Cultural Heritage, is connected to communities and ensures continuity in tradition and practices. In fact, in some non-western cultures, conservation approaches are characterised by the replacement of damaged material with new material of the same type, using the traditional techniques. This approach is widely applied when the structural materials are organic, such as timber, earth and straw, requiring frequent maintenance. The change in focus from preserving the physical fabric towards promoting socio-cultural activity offers new approaches for the reconstruction and conservation of cultural heritage.

A remarkable example is the periodical roofing repair of the Church of San Pablo of Incahuasi in Peru. The members of the community use the pre-Hispanic construction techniques for the reconstruction of the straw roof. This collective participation and engagement of the community aims to preserve the intangible

aspects of heritage in terms of oral traditions and historic construction methods. Larsen (1994) referring to the reconstruction of the Ise Grand Shrine in Japan, underlines the importance of maintaining the role of craftsmanship:

> The traditional techniques are necessary in order to preserve the historic structure, and conversely, traditional techniques are being preserved through actual preservation work.
>
> (Larsen 1994, 72)

The locally-led restoration of the Nyingma Buddhist Monastery in Nepal (Saul and Waterton 2016) illuminates another aspect of traditional heritage practice. The authors observe that the community practices of restoration are informed by the local and traditional knowledge reflecting on the Buddhist principles of change and materiality. These notions diverge from the Western perspective of conservation, especially related to the value of ‘ancient things’ which is connected to its function that allows ritual practices rather than to its age or material. According to Saul and Waterton (2017) the Tibetan Buddhism value of 'ancient things': “required a focus that was directed to the “place” in time identified as communally significant or fulfilling of an origin for certain local values, such that it was the temporal origin that acted as a referent for claims to authenticity” (Saul and Waterton 2017, 41). Significant here is the close relationship between the local community and the understanding of the place's values. The community's engagement in the restoration is an example of cultural resilience and local empowerment. Özel et al. (2014) establishes a connection between preserving traditional knowledge and architecture to enhance resilience in cultural, socio-economic, and environmental aspects. He argues that adapting flexibly vernacular solutions, integrated with technological solutions and expertise, can offer a strategy for resilience. The evolution of heritage reconstruction policies and the example of living heritage practices demonstrates that material-based interventions alone are inadequate to fulfil current conservation practices' social aim. As discussed in this chapter, the current conservation agenda has turned to managing the change in continuity with the local tradition, where the

community's involvement in the reconstruction process is crucial to safeguarding the intangible aspect of cultural heritage. In the following sections, the notion of continuity and tradition in conservation literature is explored, bridging with the resilience paradigm.

3.2 Heritage values and Resilience: the role of Tradition

The linking role between heritage values and resilience via tradition is central to developing the methodological approach of this thesis. The following sections outline the discussion concerning the meaning of tradition, which encompasses theories developed in Europe between the 19th and 20th centuries. The concept of tradition plays a crucial role in this historic period as two opposite cultural forces characterised it: one towards modernity and technological development, another addressed to the discovery and conservation of the past. From the Latin *tradere,* which means to transmit over time, tradition is an essential element in understanding resilience in the context of heritage conservation and values. Social theorists have argued that some cultural values persist through society's development as an "enduring and autonomous influence" (Inglehart and Baker 2000, 19). From this perspective, the link between past and present, through the continuity of evolving values, is attributable to the notion of tradition, as Karl Marx asserts:

> Men make their own history, but they do not make it as they please; they do not make it under self-selected circumstances, but under circumstances existing already, given and transmitted from the past. The tradition of all dead generations weighs like a nightmare on the brains of the living. And just as they seem to be occupied with revolutionising themselves and things, creating something that did not exist before, precisely in such epochs of revolutionary crisis they anxiously conjure up the spirits of the past to their service, borrowing from them names, battle slogans, and costumes in order to present this new scene in world history in time-honoured disguise and borrowed language.
>
> (Marx 1852, chapter 1)

Throughout centuries, the development of human cultures has been characterised by a dialogue between past and present generations, creating different narration and interpretation of historical events. The resulting dualism, often defined by a rupture with the past, can lead to a crisis or a revolution such as the phenomenon of modernisation. The famous quotation above from Marx's historical work *The Eighteenth Brumaire of Louis Bonaparte* (1852) expresses clearly the seemingly inevitable dependency of contemporary societies on those of the past. This relationship is interpreted by Groopman (1982, 114) as "self-enslavement" to the past, challenging the positive interpretation of tradition. In his work, Marx aims to describe the 1848 French revolution's failure, which led to the imperialist *coup d'état* of Louis Napoleon. By introducing his theory of 'historical materialism', in which material conditions influence the development of societies, Marx firmly condemns the misleading interpretation of the history of the French bourgeoisie of 1848-51 who took his model from the previous 1749 revolution. Marx implies that the imitation of the past, seen as a parody, produces a contrived reality distant from the values and issues of contemporary societies. The premise of a free choice for human beings to make "their own history" depend on "a realistic and unsentimental relation to our past" (Groopman 1982, 125).

The same aspiration of freedom from the past resonates in the architectural debate of the 20th century. The Modern Movement shared the same vision as Marx: a future characterised by technology, breaking with the old order through a revolution (Wheeler and Whiteley 1992,192). The 'Manifesto of Futuristic Architecture' signed by Marinetti and Sant'Elia in 1914, echoes this fervent attack on the past. However, the inherent link between Marxism and Modernism has been vigorously debated as it conceals a contradiction due to historical and political contingencies. Marx's theory flourished within western industrial societies characterised by the contrast between privileging of the scientific and technological progress and the workforce's alienation and subjugation. This inner dichotomy and consequent confrontation between Marxism and Modernism is brilliantly articulated by Bathrick et al. (1984). By comparing Berman and Lunn's works, as significant

representatives of the theory about Marx and Modernism, Bathrick argues that both authors confirm Marx's dual response against modernisation. On the one hand, Marx criticises commodification, fetishism, and reification, as they are modern and capitalistic products. On the other hand, Marx vividly expresses the necessity of a revolution lead by a "new men, men who are thoroughly modern, will be able to resolve the contradictions of modernity, to overcome the crushing pressures, earthquakes, weird spells, personal and social abysses, in whose midst all modern men and women are forced to live" (Berman 2010, 20).

3.2.1 Continuity within tradition

In this section, the notion of tradition as a positive element of continuity with the past is examined. The value of craftsmanship for Ruskin and the revival of vernacular architecture within the modern architecture in the Italian context after World War II (WWII) are examined. Contrary to Marx's interpretation of tradition as an uncritical emulation of the past is Ruskin's position that tradition is a "living thing in the 'to-day' which demands all his attentions and energy – moral, intellectual, creative" (Wheeler and Whiteley 1992, 1). Ruskin's idea of tradition, successively sustained by Morris, is closely connected to the social context as "architecture is an expression of society and spirit" (Wheeler and Whiteley 1992,179-208). Swenarton (2014, xvii) finds that the socialist aspiration of Marx resonates in Ruskin's work such as the *Nature of Gothic* in which he describes the work of art as an expression of man's pleasure in labour. The moral and political commitment of Ruskin towards contemporary architecture implies that tradition is a tool to interpret our past dealing with the challenges of the present and future. This vision of an ethical and socialist tradition is arguably the link between Ruskin and the Modernists, who draw on Marxist ideas, despite their notable stylistic differences. it is possible to identify the same opposition to industrial production methods theorised by Marx, and the aspiration towards the moral value of architecture in both Ruskin and in the Modern Movement.

Nevertheless, not all modernists proclaimed the same radical sense of break

with the past. From this perspective, the notion of the vernacular altered the relationship between old and new, even in totalitarian countries such as Italy where the modern architecture was inspired by the 'spirit' of the past (Glendinning 2013, 265). Giuseppe Pagano, who played a central role in Italy's rationalist architecture, proposed a comprehensive study of rural Italian architecture in 1937. Similarly, to the work of Rudofsky (1964) and Paul Oliver (1987) described in chapter 2 (section 2.2), Pagano collected examples of vernacular buildings located in Italy by documenting them through pictures and descriptions of their materials and their functions. This raises the question of why a modern architect, influenced by futurism and *avant-garde* movement, turned his gaze to domestic architecture, which is predominant in the Italian countryside. Pagano argues that the revival of 'traditional' forms from the past deprived of their functional meanings is purely ornamental. In that sense, tradition is considered as a negation of truth, and the product of men's inertia (Pagano and Daniel 1937). The detailed analysis of the various Italian vernacular typologies, such as the *trullo*, *pagliaio* and *colombaie,* aimed to demonstrate the importance of aesthetic values in relation to functions. The repetition of traditional forms of architecture is justified from the understanding of their purpose and technique. Therefore, tradition, here, is strongly connected with the functionality of a form.

After WWII, the ideas of Pagano about tradition and vernacular architecture were echoed by Ernesto Nathan Rogers. In 1954, Rogers became the director of the architectural magazine *Casabella* which Pagano previously directed during the war. However, Rogers added the word *Continuità* (Continuity) to the magazine's title, suggesting his vision of history as a process, far from the isolation and abstraction which characterised modern architecture. In the article *Continuity or Crisis?* (1957), Rogers poses a question about the legacy and the possible further development of the Modern Movement in the context of the end of the world conflict and disruption of totalitarian regimes in Europe (Giannetti and Molinari 2010). The notion of continuity provides a strong response to an identity crisis, adapting traditional values and shapes to the existing environment:

> The concept of continuity implies change within the order of a tradition. A crisis is a break – a revolution – that is, a moment of discontinuity brought about by new factors.
>
> (Rogers 1958, 188)

Roger's definition of tradition implies a continuity, intended as adaptability, between the past and the modernity. Here it is crucial to underline the connection with the 'resilience thinking' promoted by Folke et al. (2010) (see chapter 2 section 2.4) where adaptability is deemed an essential requisite for resilience. An example that translates the theory of Rogers about continuity is the project of the BBPR group of the Velasca Tower in Milan. In the design for the new building, the medieval architectural features are reinterpreted using a modern language. Thus, unlike Marx, Rogers (1957) defends the necessity to build a strong relationship with the past, developing an awareness of historicism by adapting to new conditions and needs.

3.2.2 Continuity within resilience

The question of continuity or discontinuity discussed by Rogers was a response to the social and cultural context of the post-war Italian experience. In this study, the same question is applied to the concept of resilience in historic centres affected by a natural calamity, such as flooding or earthquake. Why interrogate issues of continuity?. Since the crisis after an unexpected natural event is caused by the sudden disruption or destruction of the "normal state" of a cultural system - both in its tangible and intangible expression - the interpretation of history and traditional values for future reconstruction is a way to offer a degree of continuity and support the resilient development of a community or cultural assets.

In this context, central is the Holtorf's definition of cultural resilience (2018, 639) as "the capability of a cultural system (consisting of cultural processes in relevant communities) to absorb adversity, deal with change and continue to develop" is central. Therefore, cultural resilience is associated with the notion of

change and continuity within specific values and traditions. After highlighting the importance of architectural tradition for the development of society, it was evident that cultural heritage's resilience depends on recognising and enhancing its values. An early sociological study undertaken by Smolicz (1988), combined the notion of tradition and values concerning a resilient society. He defines the concept of tradition in sociological terms, emphasising its positive connotation as the outcome of a critical selection determined by feelings of acceptance and rejection of contemporary society. He continues that the resilience of a community depends on the “degree to which its heritage successfully interacts with new cultural inputs” (Smolicz 1988, 393) and on balance with the contemporary and traditional values. This interaction of past and present values become evident to the living forms of tradition that are continually adjusted to the changing external conditions and perpetuated by the parent community.

As previously explored (section 3.1), conservation nowadays is conceived as a practice that negotiates changes, maintains and enhances the values deemed necessary by a specific community from a local to a universal point of view. Walter (2013) interestingly claimed that in modern conservation practices, the objective classification of heritage using a predetermined set of values has proven inadequate, tending to create tensions between conservation specialists and cultural assets users. Thus, he interprets historic buildings' changes as an ongoing narrative that provides a "nourishing understanding of the resilience of a place" (Walter 2014, 647). Thus, resilience, connected with the notion of change, allows a more flexible interpretation of cultural heritage values. The link between change and tradition is a crucial element for understanding the resilience of cultural heritage and guiding conservation decisions.

3.3 Call for participation for heritage change and adaptation.

Practical questions arise from built heritage adaptation and how the process of change can guarantee the continuity of traditional values. Local community participation in the conservation and management of cultural heritage is undoubtedly one way to address this problem. Indeed, participation, intended as the activity in which stakeholders are engaged in the decision-making process (Neal 2015, 346), has become a predominant method to collect multiple narratives within the conservation discourse. However, as previously discussed, the definition of heritage, which dominated the 19th and 20th century, based on material, aesthetic, and historic values, has favoured experts such as architects, archaeologists, and historians as dominant in heritage discourse. This dynamic was powerfully theorised by Smith (2006) introducing the notion of the Authorised Heritage Discourse (AHD) intended as a Western-centred view of heritage and as a "professional discourse that privileges expert values and knowledge about the past and its material manifestations, and dominates and regulates professional heritage practices" (Smith 2006, 4). The implications and consequences of the AHD have been widely discussed by Smith (2012), highlighting the traditional hegemonic and reactionary position of international bodies and organisations such as UNESCO and ICOMOS. The UNESCO Convention (2003), represented a decisive turning point supporting the "participation of communities, groups and, where appropriate, individuals that create, maintain and transmit such heritage, and to involve them actively in its management" (UNESCO 2003, art. 15). The increasing interest towards 'unauthorised' discourse of heritage, giving voices to marginalised groups and NGO's, underlines the use of participatory methods that were already widely developed within social science, planning and architectural design fields since the 1970s.

It is noticeable that the first attempts of public participation were experimented with in architecture design practice. In this field, the users assume an

active role in their relationship with the built environment. Moreover, this approach challenges the role of the expert as the sole possessor of knowledge. People's wishes and values are translated into a project (Blundell-Jones 2009).This subversion of the expert's role is key concerning the less technocratic approach to DRM and heritage. The user's involvement in the decision-making process offers to them an increased sense of ownership. The participatory architecture approach fits into the cultural context of post WWII Europe. The urgency of reconstruction and new design, dictated by the housing emergency, led to the creation of new relationships between the built space and its users. In this period of political and social ferment, the Modern Movement crisis and its ideologies allow a different way to interpret the role of the architect and more broadly to revisit the architectural values. Significant is the formation of Team X, a group of young architects, in 1955, during the *Congrès Internationaux d'Architecture Moderne* (CIAM). The work of one of the members of Team X, Giancarlo De Carlo, is crucial in the developing use of the participatory method within the architectural process. In 1972, De Carlo contributed to the international debate with an essay entitled *An Architecture of Participation*. De Carlo's work defines a branch of the architecture of the second half of the 20th century suggesting that architecture should be characterised by the increasing participation of the user in its formal organisation.

This novel approach reflects the coeval sociological study of Arnstein (1969), which promotes participation through consultation and a transparent sharing of information. Likewise, the innovative approach of De Carlo is shaped within the methodological research of the architectural process that involves the user, his self-determination and his needs rather than formal research of the architectural design based on predetermined shapes. This approach poses a strong criticism of the position of the *existenz minimum* supported by the Modern Movement that considers the design of a space is the result of human activities only in relation to the function, losing contact with the context. In contrast, De Carlo promotes a sociological interpretation of living spaces where contradictions and complex behaviours generate diverse solutions. However, De Carlo (1980) recognises that it is difficult

to provide a unique definition of participation, as the project idea is a dynamic reality based on the communication between the people involved in the project. Arnstein's ideas of power and control, resonate with De Carlo definition of participation:

> We have participation, in fact, only when everyone takes part equally in the management of the power structure, or when the power structure no longer exists because everyone is directly and equally involved in the process of decision-making.
>
> (De Carlo 2015, 77)

The concept of participation is strongly connected to a democratic view of the construction process or an anti-establishment response to architecture's rooted mechanism. The role of the architect is also revisited: the architect is presented as an antihero concerned with social issues. De Carlo introduced the user's presence in the phases that characterise the architectural process, such as the definition of the problem, elaboration of the solutions and evaluation of the results. The user is conceived as an actual human being -no longer idealized- open to manifold possibilities and research. Therefore, the designer's role is to propose flexible and reversible solutions resulting from a "continuous confrontation" with the building user. De Carlo experimented with his theory and methodological approach in various urban projects in Italy such as the University buildings in Urbino, the Matteotti village in Terni and the urban plan of Rimini. During these experiences, he noted that the creativity and effectiveness of the solutions depend on future users' awareness and participation. Therefore, another duty of an architect is to provide cognitive tools that allow communities to make decisions autonomously.

Experience in participation projects is not limited to the architecture field. It responds to the broader emergence of participatory planning at the urban level for new development and for the conservation and management of built heritage. Interestingly, Neal (2015) associates the development of participatory practices in the UK context with the decentralisation and localism of the decision-making

process. By the 'liberalising democratic governance apparatus', the community's inclusion in heritage practices and planning policy was favoured. This concept is realised in England with the introduction of the Localism Act (UK Government 2011), and the subsequent National Planning Policy Framework (NPPF) in 2012 (Ministry of Housing, Communities & Local Government 2012), which encouraged the collaboration between the local community and council. However, despite the promotion of policies that support community engagement and participation in the UK, Neal (2015) argues that there are still challenges to integrating theory into cultural heritage practice, and to define the expert's role in participating practices. These issues are addressed by Chitty (2017), who gathered case studies of conservation professionals engaging with local communities, fostering public participation in conservation practice. Indeed, people-centred approaches have gradually become embedded in contemporary international policies to heritage focusing on the conservation of traditional knowledge and adaptation. The involvement of non-expert perspectives and different stakeholder groups has led to a new understanding of conservation seen as a process of continuity through change (Chitty 2017, 2) rather than a practice focussed on a fixed outcome.

3.3.1 Community participation in areas at risk of natural hazards

The 'social turn', which occurred in the conservation and the architectural field, also greatly influenced the DRM practices in areas exposed to natural disasters. Typically today, the local community engagement and perspectives constitute the central focus for emergency preparedness activities, undermining the experts' technocratic role. This recent approach is identified as 'Community-based Disaster Risk Management' (CBDRM). CBDRM “is a process in which at-risk communities are actively engaged in decision making” (Kafle and Murshed 2006, 16) and in identifying, analysing, treating, monitoring, and evaluating disaster risks to reduce their vulnerability and enhance their capacities. This means that people are core to the decision-making and implementation of disaster risk management activities. The involvement of the most vulnerable social groups is considered paramount in this

process, while the support of the least vulnerable groups is necessary for successful implementation (Kafle and Murshed 2006).

In the 1970s, the experimentation of participation methods and the development of sociological theories in the field of architecture were reflected in the response and management of natural disasters. Maskrey (2011) suggests that the discourse about engaging local communities to manage and reduce disaster risk was introduced systematically during the 'International Conference on Disaster Mitigation Program Implementation', held in Ocho Rios in 1984. During the conference, the rural communities' issues in the landslide- and flood-prone Rimac Valley, to the east of Lima (Peru) were examined, noting that the vulnerability of the people was connected to their social and economic condition. The lack of development was considered the cause of their exposure to natural hazards rather than the natural disaster itself. Therefore, community empowerment was considered the only action required to create a solid response to risk reduction. Maskrey (2011) points out two strands that form the community-based hazard mitigation. While the first is linked to social development and cultural and political consciousness, the second is related to mitigation measures. Thus, in the social sphere, the structural aspect is distinguished from the intangible aspect of the collective culture. The CBDRM has driven the shift from a large scale/ top-down and technological post-disaster reconstruction to a bottom-up educative approach along with the tangible and intangible adaptation dichotomy.

Pandey and Okazaki (2012), describe projects promoted by the United Nations Centre for Regional Development (UNCRD) in developing countries exposed to natural hazards. They emphasise the role of CBDRM in reducing risk as it guarantees the sustainability of long-term projects. It became apparent that a holistic approach through direct training creates an opportunity for the local community to evaluate their situation based on their experience reinforced by the technical support of external partners and facilitators (NGO, specialists and governmental organisations). It is acknowledged that top-down approaches and

withholding knowledge perpetuate the disadvantages of the most vulnerable social groups. Their study advocates for a disaster management approach in which internal and external knowledge is combined through the community's active participation. The CBDRM approach consisted of co-learning lessons to raise public awareness through seminars, demonstrations and the diffusion of best-practice manuals. It is noticeable that the CBDRM is an approach adopted mainly in developing countries (see Nepal, India, the Philippines) where the architecture is arguably still a continuing tradition of local construction using vernacular materials and methods and where there are low education and economic levels within the community. In this case, the CBDRM has been proven to support local ownership and participation, sharing information and building capacities (Petal et al. 2008). However, in developed countries, where the techno-centric approach is favoured, post-disaster reconstruction is linked to the structural adaptation adhering to the building codes. This represents a challenge in terms of introducing co-learning or participatory reconstruction experiences.

In wealthy countries, there is a general political and cultural willingness to reach safer structural conditions with the application of building codes or their enforcement. According to Petal et al. (2008, 193), while structural building retrofitting reduces the impact of disasters, events like the 1995 Kobe earthquake in Japan and Hurricane Katrina in 2005 in the USA, underline the need to expand the focus of disaster response embracing community-based approaches. Professional designers and engineers should share their knowledge and be open to dialogue with the users. Petal et al. (2008, 193-194) notes that the demands of compliance with building codes are a successful strategy when there is a “social demand for a safer construction; the educational resources for builders to know how to implement the standards; and a large, well trained, professional who can respond rapidly to problems”. However, although Petal points out that this problem is more evident in less developed countries, a dramatic gap between the inhabitants, who have delegated safety and retrofitting issues to outside engineers, builders and architects, can be seen especially in richer economies.

An example is the case of the L' Aquila (IT) reconstruction. Here, the neglection of community needs undermined its resilience. The area affected by the earthquake was militarised, and the local community was removed from the historic centre and relocated to new settlements without urban facilities and local identities. The dislocation of the community that is identified as 'victim' during a natural disaster and 'client' in the reconstruction process, inevitably leads to a failure in disaster management because a sustainable and long term project is not guaranteed. Contreras, Blaschke and Hodgson (2017) note that the recovery process in L' Aquila, was characterised by a lack of coordination between government agencies and the community, which increased the sense of displacement and alienation. This issue brings into focus the relevance of a community perspective in this thesis about building resilience. The research seeks to analyse and assess the community's response that engages with the tangible and intangible attributes of its buildings in the two case studies.

3.3.2 Maps to read spaces identities and values

This last section outlines the application and implication of cultural or collaborative mapping in heritage practices. The discussion below establishes the theoretical justification for my research's methodological choice illustrated in the following chapter. The increasing motivation to democratise cultural heritage, in terms of accessibility and inclusivity, has impacted conservation's techniques and approaches, employing social methods to support community participation. Contemporary approaches to documenting heritage values are heterodox, drawing upon various disciplines from social science to economics and combining qualitative and quantitative methods. In her PhD thesis, titled: ‘Within the Walls Project: Comparing Heritage Values as Action within Council & Community Asset Transfer Practices, York, UK 2014-2016’, Foxton (2018, 85-90) summarised different methods of capturing heritage value which provide a 'tool-box' for practitioners and researchers to experiment in their projects. In this research, I experimented with the

use of spatial analysis as a method to explore the tangible dimension of heritage, in relation to the concept of resilience.

As will be discussed in more detail in the methodology chapter, traditionally, maps were used to visualise the objective set of data or define the power dynamic of societies. However, since the 1980s, participatory mapping has emerged as a practice, allowing local communities to advocate and promote their activities in the territory. As powerfully articulated by Avrami et al. (2019, 35-49) the potential of cultural mapping in conservation practices is fundamental to explore the dynamic relationship between people and places, investigating beyond the heritage assets including social and spatial elements. Providing a practical example of cultural mapping, Avrami supports participatory approaches to engage diverse stakeholders, including the voices of those actors who have been traditionally left outside of the decision-making process. As the definition of heritage has expanded, including tangible and intangible aspects, mapping practices have been developed to represent values, tradition and oral histories in relation to their geographical context. The interest in local culture and Intangible Cultural Heritage (ICH) documentation has considerably increased in recent years within the conservation community and was widely discussed during the ICOMOS international conferences in Turkey and India (2016-2017). Yen and Cheng (2018) presented a cultural mapping project in China as a method to mitigate disaster risk. The resulting risk maps, elaborated in collaboration with local stakeholders, have proven effective for disaster prevention and cultural heritage management by providing a tool for more effective and transparent communication. Another example is Lee's (2016) research, which aimed to expand the GIS system, Arches, developed by the GCI and the World Monuments Fund (WMF), to include ICH (Lee 2016). The Arches software is a well-known open-source, geospatially-enabled software platform for cultural heritage inventory and management. Different cities have adopted it to promote their historic built heritage such as Los Angeles (USA) and the city of Lincoln (UK). The system allows users to relate multiple buildings with their historic and social significance. Lee's study adds to the Getty projects the intangible

component of heritage using a pilot study of a traditional festivity in Hong Kong, namely the Fire Dragon Dance of Pokfulam Village. These practical examples are crucial to understanding the impact of the social component in the heritage practice.

These new approaches raise a question about the expert's role in cultural heritage discourse, revealing the ontological conflict between authorising notions and discourses of heritage and unofficial forms of knowledge (Smith 2006). Provocatively, Schofield asks 'Who needs Experts?'(Schofield 2014), noticing that increasingly more people actively advocate for their heritage engaging with various activities, concluding that 'we are all heritage experts'. However, this position is contested by Hølleland and Skrede (2019), while recognising the need for the expert's commitment to making heritage practices inclusive and accessible to all stakeholders, they highlight the essential role of professionals in the field of heritage. Moreover, international and local conservation policies, such as the Faro Convention (2005) and the Historic England Conservation Principles (2008), emphasise the role of the cultural environment as a shared resource. This leads to the increasing use of participatory methods that invite the community to participate regardless of ownership. Hence, questioning the role of the expert is closely related to the increased interest in the understanding of local culture, enriching the heritage discourse with non-expert's opinions, traditions and memories. Mapping cultural heritage to describe the relationship between space and identity -focusing on the local narrative- can respond to the need to include social aspects in heritage discourse. While maps can be a tool to represent spaces lived in and shaped by the community, embedding their tangible and intangible aspects, it is crucial to understand a connection between heritage, space and identity. Here, sociologist Anthony Giddens' (1986) notion of space speaks to the issue:

> Space is not an empty dimension along which social groupings become structured but has to be considered in terms of its involvement in the constitution of interaction systems.
>
> (Giddens 1986, 368)

Kato (2006) in the study of the intangible heritage of *Shirakami-Sanchi* World Heritage Area, has shown how the work of Giddens provides a powerful lens through which to reflect on notions of time and space. The strong community place-identity and spiritual connection with the *Shirakami* natural landscape are related to the Giddens' idea of social relationship to form a sense of place. Usefully, for this study, we can consider that according to Giddens (1990, 18-20), in pre-modern times the concept of place was intimately connected with the idea of *the locale.* By this notion of *locale*, he intends the material context in which social actions and interactions occur. Separating the local perspective and the historical context from a place generates what he calls an *empty space*, where social influences are distant. Therefore, the proactive role of the community in shaping their cultural environment concerning geographical spaces is again reaffirmed.

Arguably, Giddens definition of 'place' can also relate to the one of 'historic environment' provided by deemed as English Heritage as “all the physical evidence for past human activity, and its associations that people can see understand and feel in the present world” (English Heritage 2000). The historic environment is the tangible product of the interaction of intangible past human activities which still influences our present. This is also related to the controversial consideration of built heritage as a symbol of national identity, which often raises tension and conflict between states. Smith (2006, 52) highlights the decisive role of heritage in the political discourse in terms of legitimatising or de-legitimatising national identity. However, more fundamental for this study is to question how the identity of a place is formed and how it can be maintained, especially in areas threatened by natural hazards. From an anthropological point of view, Byrne (2008) provides another interpretation of cultural heritage identity. The association between a place and a community does not directly generate a collective identity. It requires the involvement of the community in certain activities with their cultural heritage (i.e. preservation, cleaning, protection, study). Therefore, social action foregrounds the creation of a local identity related to the heritage, creating a sense of attachment and ownership. The correlation between space and social activity illustrated by

Byrne arguably refers to the scholarship and activism within social science that emerged in the 1960s. Within these social studies, Lefebvre's contribution in his seminal text *The production of space* (1991) is significant to express the dynamic between power and place. He establishes a correlation between space and social reproduction and economic production. Lefebvre's conceptualisation of space as a condition of action as well as a product of action (Molotch 1993) in terms of historical biological and architectonic human activities, enhance the role of mapping as a tool to untangle the complex social and spatial relationship. Indeed, collaborative mapping is a medium to redefine the power relationship of various stakeholders, combining a different kind of knowledge with spatial elements in a map. According to Lefebvre, space is a "dynamic, humanly constructed means of control and hence of domination" (Lefebvre 2011, 24). This theory is brilliantly captured by Dolores Hayden (1995) in her analysis of the urban spaces of Los Angeles exploring the complex meanings embedded in the concept of place including the individual and social identity and the conservation of local memory. In her work, she highlights that the inherent economic and social power represented in space results from its cultural identity, social history and urban design. The construction of place can be used as a medium to marginalise minority groups or vulnerable communities. On the contrary, if the identity and the local memory is conserved in space, this will nurture the sense of belonging of the same communities.

However, describing the concept of space only in terms of a power dynamic dictated by economic and social interactions excludes the intangible aspects embedded in the physical representation of space. These emotional elements are essential to consider in the aftermath of a conflict or catastrophe as are associated with the identity of the community affected. McDowell (2008) emphasises the role of memories and narratives attached to cultural heritage to build a local identity and how an emotional connection to it generates the attachment for a location. She analyses the political and territorial dimension of heritage, which is often manipulated to determine power relationship. Nevertheless, her definition of identity is strictly related to the cultural sphere, which includes memories and narratives. Thus, in this

research, cultural or collaborative mapping is intended as a tool to explore the connection between space and identity drawing on the tradition of the community to express their requirements for shaping the present. This method will be presented in the two case study chapters, where different mapping techniques have been utilised to describe the local disaster culture better.

3.4 Conclusion

This chapter mapped the relationship between contemporary conservation theories and the concept of resilience by developing a deeper understanding of tradition. Tradition as a means of continuity between past and future informs resilience thinking. Connecting resilience to the notion of tradition allows a system (cultural or physical) to adapt and move forward, and guarantees the continuity between generations. The chapter reflected on the entwined relationship between value-led conservation approaches and resilience. As the 20th century conservation debate shifted its focus from a predominant concern with historic fabric preservation towards a broader recognition of heritage's social values, the response to a disaster needs to be addressed not only from a materialistic point of view. Therefore, just as the notion of heritage has been enhanced to include intangible, socio-cultural values, in the same manner, the management of built heritage after a disaster has emphasised the active and participatory role of the community, its awareness and perceptions, to collaborate in finding successful solutions.

The different perception of the role of traditions have been outlined through the contrasting theories of Marx, Ruskin and the modernism movement. The understanding of tradition and continuity proposed by Rogers has been used to frame the resilience discourse in the heritage field. The critical interpretation of the past and therefore of tradition, in terms of selecting values and significance embedded in historic places assists in building resilience. The last section of the chapter reflects on the role of 'locale' as discussed by Giddens (1990) and the role of social action to foster collective identity and ownership of cultural heritage. Here,

the relationship between community and place is established through participative projects and cultural mapping. The next chapter builds upon this theoretical framework in which resilience and conservation values have been closely entangled. Indeed, the community plays an active role in this research to identify the meaning of resilience in a historic centre affected by a natural disaster. This theoretical framework will support the methodology for assessing and visualising resilience through mapping activities.

4. Methodological approaches to understand resilience

As discussed in previous chapters, the development of "resilience thinking" has resulted in a shift from a culture of reaction to a culture of preparation that considers structural and non-structural adaptations (Bosher 2008, 13). For the historic built environment, resilience is conceived as an embodied quality (Özel et al. 2014). It relates to physical and socio-cultural factors in terms of the typology, construction technique, spatial and functional configuration of the historic asset as well as the social, cultural, environmental and economic context in which the building is located. In addition, the concept of resilience from an ecological perspective, entails the capacity of a system to adapt to external hazards. The adaptive capacity embodies the learning experience of coping with changes and the ability to innovate (Tschakert and Dietrich 2010). Central to this framework is the role of the community affected by a hazard. Local communities are encouraged to proactively participate during both phases of preparedness and rehabilitation. Indeed, participation in terms of power redistribution -including how information is gathered and shared- was a key component in developing the methodological process proposed in this research.

The main research question of this thesis addresses the issue of how we can represent and assess the resilience of historic buildings located in seismic and flood risk areas; this is applied specifically in relation to the local community and its intangible values. Drawing on the experiences in cultural mapping (described in chapter 3), this chapter describes a novel methodology to understand the resilience of two historic centres that are affected by natural hazards -York and Amatrice- integrating spatial data with stakeholders' perspectives and experiences. This

methodology adopts a mix of both qualitative and quantitative methods, that are implemented by means of a Participatory Geographic Information System (PGIS). Firstly, the use of PGIS is contextualized in the broad field of 'digital humanities', exploring its potential to depict the multiple meanings of resilience. This is followed by an account of the principal methodological steps used in this study, including the criteria for the selection of the two case studies and the different data collection techniques employed. This chapter also provides an in-depth overview of the theoretical and practical problems that were encountered. Due to the differences between the UK and Italian contexts, a detailed account of the methods used for each case study is provided in both chapters.

4.1 Methodological rationale

In the last decades, technological advances in humanities-based research have enhanced the possibilities of investigation through digital methods allowing the management and creation of complex datasets. The interdisciplinary field in which humanistic study is supported by computational science is known as 'digital humanities' (Waters 2013), opens new methodological and experimental pathways. Spatial analysis is one of the key research areas that applies digital methods for the conservation, documentation and interpretation of tangible and intangible cultural heritage. GIS software and the introduction of digital and interactive mapping is the main tool for creating a graphic representation of abstract concepts implicit in systems or networks. Using maps in this study to represent the resilience of cultural assets located in areas at risk is, therefore, a dynamic method that offers opportunities for collaboration between different stakeholders, raising awareness within the community. As Bodenhamer, Corrigan and Harris (2010)'s detailed study highlights for potential of spatial humanities, argue:

> Spaces are not simply the setting for historical action but are a significant product and determinant of change. They are not passive settings but the medium for the development of culture. All spaces contain embedded stories based on what happened there. These stories are both individual and collective, and each of them link geography (space) and

> history (time). More importantly, they all reflect the values and the cultural codes present in the various political and social arrangements that provide structure to society.
>
> (Bodenhamer et al. 2010, 16)

We can consider the spatial turn in the humanities field in relation to Foucault's (1980, 63) definition of geography as a discipline that shows the dynamic relationship between power and knowledge. The French philosopher considers the map as an instrument of measurement, inquiry and final examination that allows the spatial description of the effect of power on society (Foucault 1980). Recent studies, described in chapter 3 (Lee 2016; Yen 2017; Avrami 2019), focus on the complex interpretation of spatial relationships which account for different narratives showing how culture and power are entangled with the attributes of geographic space. The urgency to provide a more complex description of the urban environment is evident in the analysis of *HyperCities* (Presner, Shepard and Kawano 2014). The authors refer to *Cities* with the prefix *Hyper*, implying the multiple narratives and representations contained in a place. To elucidate the *Hyper*-ness of the complex urban landscape, Presner et al. (2014) used the digital method of 'thick mapping' to include the multiple temporal and historic layers of a city. They provide the following definition of their methodology:

> The methods are design-centred, critical interrogations and interpretations of the multiplicity, heterogeneity, and ambiguity of the cultural record of places. It is not a book about "maps" per se but about exploring, participating, and listening, something that transforms our conception of mapping into a practice of ethics.
>
> (Presner et al. 2014, 7)

The authors propose example maps such as the 'Los Angeles Ghost Maps' or 'Mapping the 2009 Election Protests in Tehran' to demonstrate that maps can be a dynamic product of the representation of complex realities. This approach contrasts

with the positivistic method of mapping that privileges only quantitative spatial data to describe a geographical context. For this reason, as a principal research method, I explored the various applications of PGIS to represent how the concept of built heritage resilience is understood by a specific community. As will be explained in more detail in the following section, participatory mapping or qualitative mapping with GIS is a social research method that relies on participants' experiences and values to provide a spatial analysis of places. Similarly to 'thick mapping', the information gathered is multiple and subjective. Yet in contrast, participation is the central activity to further understand the relationship between a community and its environment.

The main challenge faced in this research is to visualise the concept of resilience in two different cultural and geographic realities. As illustrated in chapter 2, epistemological divergences render multiple definitions of resilience according to the field in which it is analysed. This has produced different approaches to representing and visualising resilience. To address this issue, my research seeks to interrogate the context of specific meanings of resilience by utilising mapping techniques which aim to conjure the multiple dimensions of resilience. Of high relevance to this research, the urban resilience of two South African cities, characterised by inequality and poverty was presented visually through participatory mapping (PGIS) by Borie et al. (2019). Interestingly, the authors suggest that it is impossible to use a single method to map resilience. Their findings show the multifaceted role of maps that reflects different understandings and knowledge about resilience. The use of varied mapping techniques is therefore justified firstly by the different experiences that the participants have of resilience in both cities, and secondly due to the availability of data to the researcher. My study is aligned with this position of exploring the use of PGIS according to local needs and knowledge.

4.1.1 Participatory mapping (PGIS) as a tool to build resilience

Maps have been widely used to assess the vulnerability and risk of urban assets using spatial and visual analysis. Moreover, for the community-based approach of DRM, maps are an important tool to deliver information and engage with local communities. Maps can also represent different aspects of a place connected to people's perceptions and experiences. López-Marrero and Tschakert (2011), for example, used different types of maps to depict various aspects of the flood risk of a municipality in Puerto Rico. They used participatory conceptual mapping for the recording of the causes of floods, sketch mapping for flood exposure zones, and listing and ranking maps to represent flood impacts. This versatile use of spatial elements has proved effective in promoting social learning by building on existing knowledge about floods and enhancing collaboration between the community and local institutions. GIS software is key in the contemporary development of digital mapping. This has been used to produce risk maps connected to the exposure of a place to natural disasters using objective data and quantitative analysis. Goodchild (2000, 6) describes GIS as "a computing application capable of creating, storing, manipulating, visualizing, and analysing geographic information".

As in other fields, since the mid-90s there has been a shift towards a more socially-aware approach to using GIS which prioritises local knowledge combined with spatial features. Brown and Kyttä (2013) show how in the past few decades, there has been an upsurge of new methods for engaging non-experts to identify and map social and personal features. These methods are identified as Public Participation GIS (PPGIS), Participatory GIS (PGIS) and Volunteered Geographic Information (VGI). Although the terminology is similar, these approaches are differentiated according to their methodological process, data collection techniques and technology, and global context. For the purposes of my research, it was deemed most appropriate to adopt the PGIS method as it is more focused on social learning and community engagement. It encourages the community to recognise the social values associated with the spatial elements of the urban context. Participation is a

key component for this methodology, which is based on the quality of the information shared. The well-known model proposed by Arnstein (1969, 219) for participative empowerment suggests that information is an essential component of legitimate citizen participation and consequently of democratic management of urban centres. More recent critical reappraisal of this model (e.g. Tritter and McCallum 2006; Cornwall 2008) also indicates that for different stakeholder groups, different levels of informed participatory interaction are desirable and appropriate. Essential to empowerment, then, is ready and flexible access to a trusted system for sharing information between city institutions and citizens. This enhances decision-making, in this case, to increase the resilience of heritage assets - historic structures, collections and infrastructure - to natural hazards. In this manner, rapid and holistic management of information between city institutions and citizens can enhance resilience.

PGIS uses data gathered by traditional social science methods such as interviews, questionnaires and focus groups and combines them with spatial features in a map (Dunn 2007, 616). Thus, PGIS, in contrast to the established GIS application, uses people's knowledge and perceptions as a data set and represents them through spatial analysis emphasising the active role of the local community. Community mapping has been widely used to assess the vulnerability of urban assets using spatial and visual analysis. Moreover, in a community-based approach of DRM, maps are an important tool for visualisation both to transmit information and provide an engaging interface for local communities. Understanding people's adaptation and coping strategies is essential not only to inform planning policies but also for specialists combining technical data with local spatial knowledge. According to McCall (2008, 2), the use of PGIS within DRM has been limited to understanding the causes of risk and mitigating its impact. In fact, in his extensive review, he considers PGIS applications only in terms of climate risk and vulnerability identification, disregarding resilience and cultural discourses in favour of physical and behavioural mitigation measures (McCall 2008). The use of participatory mapping to investigate the formation of community and built heritage resilience

remains an under-explored field. However, in recent years more studies have started to apply PGIS to map cultural aspects in order to mitigate the impact of natural hazards (Munro et al. 2016; Yen and Cheng 2018; Borie et al. 2019).

Based on the literature, it is possible to distinguish two main approaches of community mapping: participatory and collaborative mapping. Participatory mapping uses data derived from the relevant stakeholders, in terms of their perceptions and ideas to engage them in the decision-making process; whereas collaborative mapping integrates community and field data with agencies' information (Kurniawan et al. 2017). In other words, collaborative mapping is oriented to facilitate the dialogue between local governments or organizations with the community, using both sources of information displayed through geospatial data. While I use information from both institutional sources and community knowledge, the participatory nature of this research requires a stronger emphasis on data derived from local stakeholders. This approach supplements and improves the content provided by technical sources with user-generated information. It creates a new online platform in which local and institutional knowledge is combined and displayed. The spatial analysis of PGIS is an ideal tool to represent both the tangible and intangible (perceived or associated) characteristics of historic buildings affected by natural hazards recording their architectural elements, materials and conservation interventions but also the stakeholders' behaviour, values and perceptions. As such, this methodology encourages a 'resilience discourse' around built cultural heritage located in areas at risk, fostering transparent communication between different stakeholders. Incorporating community perception of risk into a map can elucidate the various levels of resilience within the social and physical environment. One objective of my research is to investigate how effectively the creation of a web-based map can represent the resilience of historic buildings and the community's response following disasters such as flooding and earthquakes.

4.2 Selection of the case study

The main reason for selecting two European historic centres - York and Amatrice - as principal case studies, is to allow a comparative analysis of the understanding of the tangible and intangible aspects of resilience. Besides their different socio-political and economic contexts, both centres have an outstanding cultural heritage which is exceptionally vulnerable to natural hazards. This provides an opportunity to explore how resilience applies to such contexts, emphasising disaster management practices specifically during the rehabilitation process. The choice of the case study method allows, through empirical enquiry, the comparison of real-life events, small group behaviours and individual experiences. The objective of this method is to expand and generalise on the theory. The essence of the case study is to guide future decisions through the understanding of important contextual conditions. However, due to the dimension of the urban scale and the difficulties in the data collection process, I decided to adopt the pilot case study method to refine my data collection and test the methodological pipeline. As proposed by (Yin 2009, 93), my pilot case studies "assume the role of a laboratory" in terms of defining a protocol of actions and observing different phenomena from many perspectives.

The overarching context for the two cities and the different nature of the disaster recovery and experience have led to the adoption of mixed methods for the analysis. They reflect the different local contexts and issues of the two historic centres. Whereas in York it was easier to reach members of the local community, in Amatrice, due to the process of depopulation and community displacement, the approach to gathering information was necessarily different. That in turn raises questions about the nature of community participation and engagement and the impact of natural hazards on the community and its capacity to participate.

4.3 Description of the methods: a mixed approach

As stated earlier, this approach integrates physical, social, and cultural features into a map and aims to provide a more comprehensive collection of data to evaluate the complexity of caring for cultural assets in urban areas than would otherwise be available from a study limited to only the structural or social aspects. Participatory mapping is often characterised in the literature by the adoption of mixed methods of design. Creswell (2018) states that mixed methods provide an in-depth analysis to address the complexity of a research question, basing the results on a breadth of evidence overcoming the weakness of using only qualitative or quantitative data. However, the combination of qualitative and quantitative analysis can also be criticised due to their different epistemological commitment and separate paradigms (Bryman 2012, 611). Thus, it is necessary to reflect on the criteria of priority and sequence of decisions while designing the methodology to guarantee an even weight between the two methods. Conversely, the study proposed by Brown et al. (2017) suggests that in the PGIS practice mixed-methods increase the validity of the research. Through triangulation, Brown et al. (2017) provide criteria for assessing validity to understand the intangible values of a specific place using participatory mapping techniques. Thus, the complexity of the research question, that is to explore the meaning of resilience in its tangible and intangible aspects, requires the use of mixed-method approach. A convergent parallel mixed-methods design (Creswell and Plano Clark 2018, 166) is used in this study, allowing the comparison of the results from the quantitative and qualitative analysis. This is strongly connected to a qualitative understanding of the cultural and historical context, perceptions of risk, and of resilience. Tacit knowledge is examined in relation to the local seismic and flood culture, both in terms of policies and practices.

In this mixed-methods design, semi-structured interviews and focus groups form the core of the qualitative data. Afterwards, this data is integrated and supplemented with the quantitative data gathered through a questionnaire. However, it is important to emphasise that the divergent nature of the two case studies lead to a different use of both quantitative and qualitative methods. In the

case of York, to assess resilience, a predominantly quantitative method is tested which allows a comparative analysis between different buildings. As will be discussed in chapter 6, York's expression of resilience is more tangible in terms of structural interventions which improve the response of buildings to the ingress of water. Whereas in Amatrice, where the tangible evidence of built heritage has been largely destroyed by the earthquake, a more inductive and interpretive approach is required. A mainly qualitative study is proposed here which allows for a different explanation of the relationship between people, values and resilience.

4.3.1 Quantitative methods

In this study, GIS quantitative data are used to assess the resilience of the historic buildings in the city of York affected by the 2015 flood. The quantitative approach developed in this research is based on the body of literature discussed in chapter 2. In the light of this, my research study and methods for the York case study aim to appraise and quantify the resilience of historic buildings through a range of indicators derived from the theoretical understanding of resilience. Resilience is often assessed on a larger scale (e.g. urban or national) while built heritage is disregarded from this broad approach. In my research, resilience is conceived of as an inherent characteristic of historic buildings. Thus, a resilience approach is addressed at the building level in order to describe its complexity in terms of physical and socio-cultural aspects. Assessing and measuring the resilience of individual historic buildings provides an alternative critical analysis, within DRM, which can potentially guide conservation strategies. A quantitative analysis, which is focused on the outcomes (Denzin and Lincoln 2018) of measuring resilience through indicators is deemed the most suitable approach. However, this novel method is not proposed as a replacement for the traditional analysis of vulnerability assessment (Wisner 2004) for built heritage located in areas at risk, rather it is intended to be a complementary study for an in-depth and holistic understanding of the issues of buildings at risk. Rather than focusing on the vulnerability and damage assessment after a flood event, there is a need to emphasise prevention and mitigation techniques that take into consideration the minimal loss of heritage values and

increasing the resilience of the built assets.

A quantitative assessment of resilience has been used predominantly in the case of York using a questionnaire as a primary method of data collection. In the case study chapter I will illustrate the methodological process in detail. It was possible to build a consistent database for York due to both the rich availability of information, both primary and secondary, and the direct participation of residents. In contrast, the quantitative study in Amatrice was undertaken with a different purpose. The questionnaire proposed to the former householders in the Italian historic centre aimed to investigate the anti-seismic technologies adopted in the buildings before the earthquake and to explore the overall perception of the community concerning the reconstruction process. Due to the severe destruction of the historic centre and the scarcity of data, the quantitative assessment of resilience developed for the York case study was not applicable to Amatrice. The indicators of resilience require a standing building which has withstood an earthquake. Despite the inability to collect quantitative data for a resilience assessment, the data generated via questionnaire in Amatrice provides an overarching guidance for future reconstruction of the historic centre. Resulting thematic maps inform an understanding of resilience in terms of changing risk perception and understanding of the community. The following section explains the qualitative approach used to visually depict resilience in Amatrice.

4.3.2 Qualitative methods

Inspired by the ethnographic approach, which descriptively studies communities and groups in terms of their behavioural patterns (Marshall and Rossman 2011, 19), I too describe the interactions of stakeholders with various historic buildings exposed to flood and seismic events and their adaptations. A focus on individuals' life experience, their perceptions, feelings and judgements concerning the relationship between risk and resilience is also relevant in order to address my research question. The qualitative methodology of this study shares some general assumptions with the social constructivism approach. Central to this sociological

stance is the active interaction of the participants and meaning-making of aspects of reality. From a constructivist perspective (Crotty 1998):

> All knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context. […] meaning is not discovered but constructed.
>
> (Crotty 1998,42)

Focus group and workshop methods in this research are used to elicit a discussion in order to produce new understandings and meanings of resilience related to the context and personal experience. The subsequent integration of qualitative participatory methods with the GIS software to understand and visualise a theoretical concept such as resilience is a novel contribution to the field. A qualitative approach aims to comprehend the meaning of resilience in a particular context from the perspective of the local community. As 'observation is central for qualitative research' (Marshall and Rossman 2011,139); I will consider both the emic -local community view (insider perspective)- in the first phase and the etic -researcher interpretation (outsider looking in)- perspective during the analysis of the data. The use of a qualitative approach in this research was also selected to establish the meaning of resilience in a specific cultural context concerning the community and their understandings of the ongoing rehabilitation process and adaptation. The notion of resilience is explored using analysis in a grounded theory process, where the data are systematically gathered and inductively analysed (Bryman 2012, 567).

4.4 Research process

4.4.1 Sampling selection

The PGIS methodology developed for this study is designed to investigate how resilience is understood in both cities. In applying this method, the ethical issues described by Rambaldi et al. (2006, 108) have been considered by addressing the *Who?* and *Whose?* questions in terms of participation and empowering issues. According to (Rambaldi et al. 2006), the outcomes of using mapping as a medium to investigate local issues are determined by the researcher who controls the process in terms of selection of participants and discussion of themes. As previously stated, resilience has a tangible and intangible component. To adopt a holistic approach, it is necessary to involve the community in this study. However, the concept of community is complex and defined differently depending on the context. According to McEwen et al. (2016) communities in areas at risk can be considered as a group of individuals that lack specialist knowledge or that share the same common interests and values. Many other definitions are possible. In this research, instead of adopting the generic term *community* for my methods, I refer to the term *stakeholder*, defined in the Nara+20 Document as:

> A person, group or organization who has a particular interest in the heritage based on special associations, meanings, and/or legal and economic interests, and who can affect, or be affected, by decisions regarding the heritage.
>
> (ICOMOS 2014)

As discussed more deeply in the following section, the three principal forms of data gathering were questionnaire, semi-structured interview and focus groups. These data collection methods required different criteria for sampling. Concerning the questionnaire, I first selected the areas of the two urban centres where I could recruit people who have suffered impacts of natural hazards. The sampling frame comprised 20 households for each case study. A 'door-to-door' and 'face-to-face' approach was privileged as recruitment strategies in order to engage the

participants with the importance of the research and ensure confidentiality. In contrast, for the semi-structured interviews the research project employs purposive sampling which selects units of the population based on specific features considered relevant to the research question. A focus group or workshop was organised in each city to explore the potential of GIS and to collect qualitative data around resilience. Two key informants, defined by Bryman (2012, 439) as gatekeepers who smooth access for the researcher, were part of stakeholder groups in each city. They actively assisted in the recruitment of other participants and essentially workshop participants self-selected in accepting the invitation to take part.

4.4.2 Methodological steps and COVID-19 impacts on the research

The first step of the methodological process was to create a database to connect to the GIS platform. This consists of an Excel spreadsheet which contains all the qualitative and quantitative data gathered, with other sources of information such as images, other maps, and external documents (see annex 6 and additional documents). For both case studies, the first phase included reviewing documents such as historic pictures and cartography, risk maps, future disaster scenarios and a review of literature from various sources on both flooding and earthquakes. In addition, for Amatrice I organised fieldwork, during which I conducted a reconnaissance survey of the historic centre and nearby localities affected by the 2016 earthquake. From this preliminary fieldwork, it became clear that the methods to investigate resilience in the two case studies had to be different, due to the different environmental context and impacts of the natural hazard on the urban environment and local community (see chapter 5).

Therefore, the second phase differed in the two cases. In York, after the selection of the areas, buildings and stakeholders, a questionnaire was presented to the buildings' occupants, to gather information about resilience and the flood experience. Following this, I organised a focus group with key stakeholders in York to explore the meaning of resilience and to reflect on their own experience. In Amatrice, due to the massive destruction that had occurred and the depopulation

of the community, I first organised a mapping workshop with a selected group of people to investigate the relationship between values and resilience. As in York, the group provided their own definition of resilience according to their local knowledge. In a second phase, I conducted a questionnaire in the commercial area built near the historic centre of Amatrice after the 2016 earthquake (Appendix 7,7.2, Fig. 32). This aimed to investigate the seismic experience and people's ideas for reconstruction. The data collected through these activities constitute the database for the construction of the GIS platform. The last phase of the research entailed the presentation of the resulting interactive map to the participants of the project and the dissemination of the results which is fully explained in the following section. However, due to the spread of COVID-19 and the restrictions on international travel, it was not possible to present the research in Amatrice. The pandemic raised ethical questions on conducting research within a community in a period characterised by the risk of illness and social and economic uncertainty. Considering the possible impact of COVID-19 on the mental health and emotional state of the participants of the study, I decided not to formally present the results of the interactive map in Amatrice. Rather, I simply contacted participants via email, attaching a link to show the results of the work, as an appreciation of their involvement. I did not receive a formal feedback on the response to the email. Thus, I did not include this material in the data gathered.

4.4.3 ArcGIS online to display and disseminate the research

As previously stated, the last stage of the research envisaged an analysis and dissemination of the results through online GIS software known as ArcGIS online. Digital technologies are a key component of this research to support social learning and ensure data accessibility. The software is flexible and allows the creation of different maps which can creatively display different sets of information previously developed using the ArcMap GIS. The data and maps are stored in a secure and private infrastructure owned by Esri and are accessible only to me via my password protected University subscription. Finally, to validate my research I adopted the respondent validation process (Bryman 2012, 391). In other words, I provided the

participants and key members of the local institutions in York with the result of the mapping process for review and comment. Their feedback and observations were implemented in the revision of the maps and offer possible pathways for future research and analysis. Following this methodological process, I confirmed that the researcher's view on the issues raised during the data gathering activity and design of the map was congruent with the view of the participants.

4.5 Data collection techniques and analysis

Within the multiple methods employed to collect data there is a clear distinction between objective (institutionally-derived factual datasets) and subjective (derived from individual views) sources. These integrate the intangible perspective of the local community on risk and resilience with the technical literature provided by the local and national organisations. This study combines field data -acquired with the questionnaire, semi-structured interviews and focus groups- with agencies' information. The technical data were used to contextualise the local community perspective. They refer to secondary sources of data such as risk maps and historic / architectural characterisation of buildings in terms of typology, listed status and building-materials.

DATA COLLECTION TECHNIQUES	DATA	ANALYSIS	OUTPUT
Questionnaire	PRIMARY QUANTIATIVE	GIS	PGIS online interactive map
Semi-structured interview Focus group Workshop	PRIMARY QUALITATIVE	THEMATIC CODING	
Documents Research	SECONDARY DATA	GIS	

Table 4.1 Research process summary

To understand resilience in two historic contexts affected by different natural hazards, a systematic method of analysis that encourages a comparative investigation is required. Thus, the mixed method approach of this research necessarily utilises two different methods of analysis. Thematic coding was used to

analyse the qualitative components and GIS analysis for the quantitative data. Those analysis techniques are fully explained in the appendix (Appendix 5 and 6). All the interviews transcriptions form Appendix 4. The participants' quotes included in this thesis follow this structure for the reference: Participant ID, Appendix number, Appendix heading, Paragraph number. In the following sections, the principal methods of data collection are described and a more detailed account of these methods is included in the related case study chapters.

4.5.1 Semi-structured interviews

This method is a central qualitative component of my research and the semi-structured interviews contribute important insights for understanding the issues that emerged in the post-disaster phase and the impact of the disaster on community and heritage. Investigating grass roots activity developed by members of the community following the natural hazard event was of special interest. In both case studies, there was citizen mobilisation and activism for the protection of cultural heritage. The 'Red tower community group' in York and the 'Comitato Civico 3 e 36' in Amatrice are the principal examples of community action examined in this research. This provides a further comparative analysis between the two contexts raising additional issues about the relationship between institutions, heritage and community.

Moreover, the purpose of adopting semi-structured interviews as a method was to validate the use of PGIS as a useful tool to local organisations for urban analysis and decision making processes in at risk areas. After completing the resilience web-map of the two cities, I identified key contacts responsible for the management of cultural heritage in order to request feedback and advice for possible implementations. This flexible research method allows participants to contribute relevant topics for the research in a discursive and creative way. Kvale's (1996, 129) guide to formulating interview questions highlights the importance of producing thematic knowledge during the dynamic discussion with the interviewees. The relationship between the research questions and the interview questions in my

study is clear and direct in reflecting the research concerns and interests.

4.5.2 Focus Groups

The focus group is a practice which aims to explore the research questions through peoples' perceptions and experiences. Morgan (2002) describes a focus group as "a research technique that collects data through group interaction on a topic determined by the researcher" (Morgan 2002, 141). In both case studies, this technique was employed mainly to investigate the meanings of resilience and the personal experiences and feelings of the participants about the natural hazard that affected their city. In order to balance the discussion on the topic and allow an even contribution from all the participants, I assumed the role of moderator and followed a structure of questions while maintaining awareness of timing. Morgan (2002, 148) pointed out that this structured approach has been criticized by social scientists as it could limit the contribution of the participants. Despite following a structure, my questions were open and short and my involvement was minimised. However, one of the limitations of the focus group is issues with reticent speakers (Bryman 2012, 508). I overcame this issue by using interactive display tools, such as post-it-notes, to engage the group in a discussion around the meaning of resilience. This technique allowed participants to materially reflect on their contribution without the potential inhibition of speaking in a group.

4.5.3 Workshop on Mapping Resilience

The community mapping workshop was only used as a research technique in the historic centre of Amatrice. This was because a direct observation and interaction with the buildings and occupants was impossible due to the severe damage caused by the earthquake and subsequent demolitions. Wates (2014, 94) defines mapping as a non-verbal tool that can reflect people's ideas and perception relative to a spatial area. The purpose of the mapping activity was to explore the values associated with the places and buildings in the historic centre of Amatrice. The analysis of spaces through their meanings and traditions was a crucial step to

provide an alternative description of the city, fostering the resilience paradigm rather than focusing on damage and vulnerability. Referring to Bodenhame's (2010) initial definition of space as a container of individual and collective stories and values, the mapping activity in Amatrice was crucial to understand how the resilience of historic cities could be interpreted and enhanced. Therefore, the mapping workshop followed this purpose. Hard copy maps were provided to the participants to reflect on the values of specific places through their memories. The resulting outcome contributes rich data to the database for GIS mapping.

4.5.4 Ethics

Given the tragic consequences of the earthquake which caused up to 300 fatalities, ethical issues were considered of paramount concern before collecting primary data in Amatrice. Though a markedly less tragic circumstance, similar sensitivities were considered prior to data collection in York. The ethics application was approved at an early stage of my research. Due to the extremely sensitive and emotive nature of the research theme, I designed a participant information sheet and consent form to provide a full explanation of the research to the respondents, highlighting the implications of their participation in the study. Care was taken to minimise any potential distress for participants. Interviews were conducted in a neutral and familiar environment avoiding personal questions related to the emotional impact of the tragic event. Moreover, during the focus groups and questionnaires, I assured participants that their personal information would be kept confidential, guaranteeing anonymity. Participants' interview responses are quoted using only their gender and occupation. For example, **'P1 female architect'**, the occupation is provided in order to show the level of expertise and involvement in heritage discourse. For the questionnaire, respondents are described according to their gender and building occupancy, e.g. **'R1 female, tenant'**. This was done to highlight the relationship between the user and the recorded building. During the group activities, I requested oral consent from participants to take photographs. COVID-19, as an unforeseen circumstance, has affected the final stage of the research due to the impact on vulnerable participants. This was a consideration in terms of the planned feedback

workshop in Amatrice, as explained above, for which an alternative approach was adopted.

4.6 Summary

This chapter described the novel methodological approach designed to visualise and investigate how the concept of resilience is perceived in two different case studies. Drawing from the theoretical discussion of the previous chapters, I have used Participatory Mapping in a mixed-methods approach to depict the multiple narratives around resilience and risk. This constitutes an original contribution to participatory applications of GIS in the conservation field. Due to the complexity of the research question, I have selected two historic centres to explore how resilience is understood in different cultural and socio-economic contexts, focusing on the role of maps as a tool for representing different meanings. Thereafter, I justified the use of PGIS which requires the use of mixed-methods which integrate both quantitative and qualitative analysis. I have also explained the research process highlighting the different sampling strategies adopted according to the data collection methods. These differ depending on the varied social and cultural contexts encountered in the two case studies. Questionnaires were used for the collection of quantitative data whereas semi-structured interview and focus groups constitute the base for qualitative analysis. The adaptability of PGIS in different contexts, responding to local needs and requirement, demonstrates the advantages of this method. This contributes to different understandings and representations of resilience which are described in detail in the following empirical chapters. This begins with a comparative account of the local disaster culture in the two historic centres and the presentation of different citizen-led initiatives.

5. Understanding the context through local disaster culture

This chapter reflects the contextual research carried out for the two historic centres of York and Amatrice. I analysed primary and secondary data through the lens of the 'resilience thinking' described in the literature review. I look especially at how cultural heritage and communities have adapted, transformed and have been shaped by external hazards. Central to this is exploring how the notion of local disaster culture (see chapter 2), related to flooding and seismic events, is applied in the two-case studies. In the first part of the chapter, as part of the contextual research, the local flood culture of York is explored. This stems from the results of my MA dissertation (Sprega 2016) which aimed to test a new methodology to record the traditional methods used to mitigate against flooding and increase the resilience of historic buildings. This is followed by an account of how 'resilience thinking' has influenced policies in the UK in terms of flood and risk management and their application in York. Moreover, grassroots, cultural and academic initiatives have been described as complementary activities to the governmental approach to flood risk. Finally, the 'Red Tower project' in York is presented as a noteworthy example of a community-led project with a strong focus on both tangible (connected to the fabric of the building) and intangible (related to memory and people actions) resilient approaches.

The second part of the chapter presents the contextual research of the historic centre of Amatrice, following the same structure used for the case of York. After providing an historic and geographic contextual description of Amatrice, I present the historic elements used to mitigate the earthquake that form the local

seismic culture of the place. Then, some Italian earthquake experiences are described, defining different reconstruction approaches that historically have been adopted at the national level, focussing on the impact of Italian building codes that have been applied to the historic buildings in response to earthquakes. Here, practical questions around the strength of local disaster culture arose when traditions of 'good construction practices' are lost or neglected. To conclude, I present a citizens-led activity, namely 'Comitato Civico 3e36' developed in Amatrice after the earthquake to protect the damaged cultural heritage and to foster resilience within the community. Overall, this chapter focuses on the research context providing a historical, cultural and policy framework in which the thinking of resilience is modelled. Therefore, the chapter foregrounds the data of the two case studies presented in the following empirical chapters.

5.1 Local Flood Culture of York

The architectural character of York is -like many historic towns- influenced by its history, its topography as well by its exposure to environmental hazards such as flooding. The historic centre of York is located in a unique landscape that forms the Vale of York which is an alluvial plain (Appendix 7, 7.1, Fig.3). York is sited in a strategic position at the confluence of two main rivers. The largest is the river Ouse which historically tends to flood. The second, smaller one, the river Foss has not flooded since the 1980s when the Foss barrier flood defence was constructed at the conjunction of the two rivers. As I will show later, it is apparent that the geological and hydraulic configuration has influenced the urban pattern of the city centre allowing the flourishing of a varied architecture. Indeed, the central area of York is a remarkable palimpsest of traditional architectural typologies, which contributes to its historical and aesthetic significance. This is represented by the juxtaposition of different styles, construction techniques and materials which compose the architectural character of the city centre. The characterisation appraisal of the City of York council (2015) highlights the complex relationship between the natural environment and architectural typologies and socio-economic factors that have

shaped the historic centre of York. Similarly, The Royal Commission on Historical Monuments of England (RCHME) (1981) presents a record for the pre-modern architecture in the historic centre. The inventory shows the use of limestone for civic and high status buildings during the Roman and Norman period, while residential timber frame buildings were developed during the middle ages, and brick construction characterised Georgian and Victorian buildings.

Historically, the ever-growing incidence of flood events has threatened the conservation of cultural heritage in central York (Figure 5.1). Over the centuries, the community of York has adapted to the flood risk using technological and structural solutions reflected in the construction criteria of the buildings located along the two rivers (see appendix 7, 7.1, Figs 4 to 10). In my MA dissertation (Sprega 2016), I identified the tangible presence of architectural elements which form the local flood culture of York (see chapter 2). This was presented in terms of how buildings have been adapted to tackle the flooding. Specifically, I analysed Cumberland House, a grade I listed building located in the King's Staith area which historically is prone to flooding. The 18th century building presents architectural *anomalies* (Ferrigni et al. 2005, 102-103), which alter the ordinary construction methods to adapt to the different environmental circumstances. Exemplary is the presence of the limestone basement which prevents the infiltration of water to the upper floor by raising the building above the flood level. In addition, the extensive use of hydraulic mortar in the most exposed elevation is another measure adopted to mitigate eventual water damage on the brick wall. It is noticeable that while attempts to protect earlier buildings located in the King's Staith area from flooding involved building a solid wall, attempting to keep the water out, the mitigation measure in the case of Cumberland House followed a different approach which accepted the inevitability of the flood events. In the discussion of my dissertation I argued that the systematic record of these architectural features, which represent the adaptation of the building to the context and its response to flood risk, is crucial to understand the local flood culture of a place. The knowledge of the local flood culture could enhance the significance, and the response, of the building in relation to its environment.

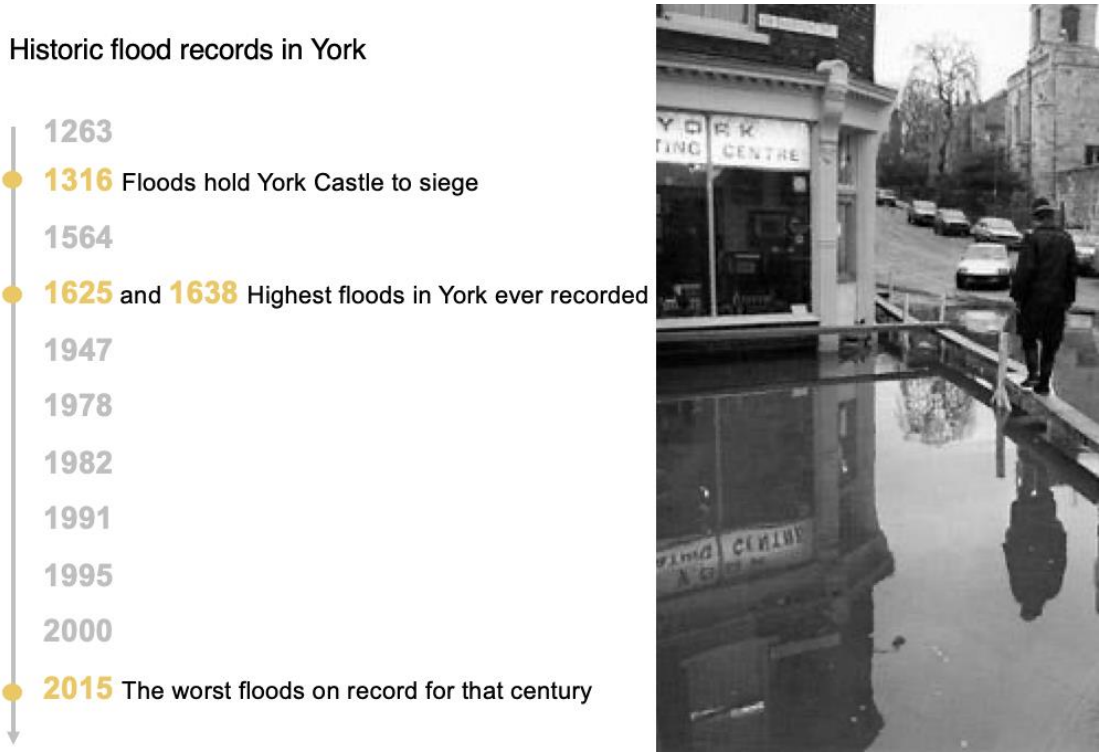

Figure 5.1 Historic flood records in York, source (Macdonald 2012). *Image: 1982 flood in York, a policeman makes his way along the raised wooden platforms at the corner of Hertherton Street and Marygate ©cyc.sdp.sirsidynix.net.uk*

Another significant example of building flood adaptation over time is represented by the Merchant Adventurers' Hall. The historical, archaeological, and social significance of this iconic building has been widely discussed elsewhere (The Royal Commission on Historical Monuments of England (RCHME) 1981; Hunter-Mann 1995; Giles 2000; Miller and Giles 2015). Here, the traditional tangible and intangible features of the buildings that contribute to the local flood culture are described and provide historical background to the Merchant Adventurers' Hall response to the 2015 flood, which will be analysed in the following chapter. The building is located along the river Foss, which was considered during the middle ages to be the "commercial area" of the city due to its proximity to the base of York's saltwater fish trade and the marketplace situated in the Fossgate, as well as the Pavement area. Despite the strategic commercial position of the Merchant Adventurers' Hall, the area has been historically prone to flooding. This is evidenced by the flood indicators placed in the undercroft (see appendix 7, 7.1, Fig.14), which show that the first floodwater line recorded refers to the 1831 flood and the recent

one is relative to the flood event in 2015. Moreover, there are historic descriptions of flooding that affected the building such as the one from Hartshorne (2011, 79): "The great flood of 1947 invaded the undercroft and the chapel to a record height of 3ft and 4in above floor level".

However, studies carried out by the York Archaeological Trust (Giles 2000, 45-46) revealed that throughout the medieval period the building was subject to recurrent flood events which structurally affected the timber posts of the ground floor. The incidence of flooding was exacerbated by the creation of the *stagnum-regis* (the King's Pool), which was used as a moat for the two new castles built in the South- East area. According to Giles (2000), in order to avoid the ingress of water, the medieval floor was raised to the height of 6.7 m AOD. This was deduced from the presence of historical deposits of soil, gravel and rubbish used as filling materials. The building was restored and remodelled during the 19th and 20th century to repair the structural damage caused by flood events. During the restoration of the guildhall in late 1937 the original medieval floor of the undercroft was revealed (Miller and Giles 2015, 37) to be situated 1.5 m below the present level. This is tangible archaeological evidence of a flood adaptation to the building that informs us of its flood history and potential risk.

Cumberland House presents a single-phase construction; its original plan embeds architectural elements to prevent flood damage, which is a designed response to the historical and environmental context of the building. In contrast, the Merchant Adventurers' Hall is an example of how a building has been adapted over time to mitigate flood risk; recovering and enhancing its resilience through simple measures. However, in the building, there are elements that preserve the memory of the historic flood. This includes a flood plaque and an exhibition of the archaeological excavation in the ground floor. The *memorialisation* of disasters such as flood events is a response to DRM policies that aim to inform communities about potential risk (Le Blanc 2012). Specifically, McEwen et al. (2016) provide a detailed description of flood 'materialisation' as:

> The practices by which flood events, character and impact are visualised, captured and shared in public as well as personal settings, through use of graphic marks, objects, texts and images. Flood 'memorialisation' is the process by which 'facts' of the event (e.g. high water levels) are recorded and the (emotional) memory of flood impacts is honoured.
>
> (McEwan et al. 2016, 19)

In the city centre of York, there are numerous examples of epigraphic marking inside public buildings, bridges, and in public areas such as at the entrance of Tower Gardens. As McEwan and Le Blanc suggest, these indicators serve as a *medium* to increase risk communication and to establish a solid flood memory within the community (see Appendix 7, 7.1, Fig. 15). Nevertheless, Le Blanc argues that these indicators are limited in that they inform only of the current risk, instead of risk reduction. However, he concedes that the scale of these urban features is important to influence the perception of the risk. Developing risk awareness is a crucial step to enhance community resilience, but risk management and perception cannot only rely on occasional urban elements that only inform about the historic flooding. It is apparent that there is a need for a more holistic local flood culture narrative for the city to be able to depict the complex relationship between heritage and its environment. The identification of tangible evidence of locally evolved building traditions and urban design features adopted to cope with the flood threat, as well as clear risk communication contribute to the local flood culture of a place. In the following sections, I will present the aspects of York's local flood culture which relate to intangible values in terms of policies, community actions and behaviours that shape the resilience of the place.

5.1.1 Managing the flood risk: flood history and response in York

The following two sections aim to outline the different strategies adopted historically in the UK to manage flood risk using York as the main case study. This provides a

complementary description to the Italian seismic approaches described in the Amatrice section of this chapter. In 2015 the historic centre of York experienced the worst flooding for many years. It affected the heart of the Roman, Viking and medieval city. According to Radley and Simms (1970) flooding episodes in the Vale of York are caused during the winter by rain, snow melt and the thawing of frozen soils. In the summer, thunderstorms increase the risk of flooding. In recent years, there has been an increase in flood events along the River Ouse (Macdonald 2012), which have had a significant impact on traditional building materials with consequent structural issues and a loss of original fabric. Such events are becoming more severe and frequent due to multiple factors including land use changes, urban development and more significant climate change (Environment Agency 2012). The studies of both Longfield and Macklin (1999) and Radley and Simms (1970) highlight the relationship between the incidence of the historic floods in York with changing climate conditions, providing an inventory of the frequency of flood events recorded in the last centuries.

Interestingly, Radley and Simms (1970) highlight the first evidence of flooding events in York from the end of the Roman period and the subsequent construction of flood control measures. In 1035 the authorities allowed residents to consolidate their own river frontages, though larger official consolidations were built in the 15th century with the erection of two parallel limestone walls with an internal vaulted passageway (Sprega 2016). Modern structural interventions were implemented along the two rivers between 1986 and 1993 in response to the frequent flood events which marked the beginning of the 20th Century (see floods in the year 1947, 1978, 1982, 1991, 1995). The barriers present a mixture of material such as concrete, earth embankments and brick or stone. Most of them have integrated flood-pump stations. The severe 1982 flood was caused by the snow melt in the Upper Pennine catchment of the river Ouse and exacerbated by heavy rainfall. The EA undertook a feasibility study called 'River Foss flood alleviation scheme' (full project in NRA 1996) in order to construct the Foss barrier in 1987. The barrier consists of a pumping station that regulates water flow from the River Foss into the

River Ouse, as the flood levels of the two rivers are closely related.

The creation of the barrier has protected the city on several occasions, including the floods of 2000, 2007 and 2012 and forms part of York's city-wide defences (Environment Agency 2016b). However, the 2015 episode was an exception due to an excessive amount of rainfall. According to the EA, the pumps were struggling to cope with the volume of water. After warning the 2,300 properties at risk of flooding, they lifted the barrier. This decision significantly reduced the impact of the flood on the Foss area, as the water flowed into the Ouse instead. Nevertheless, over 600 properties were flooded. The damage to historic buildings as well as to shops, stock, and movable objects was more serious along the Foss than in areas along the Ouse. This was because the community was not prepared to cope with the flood event as they had previously been protected by the Foss Barrier from such disasters. This highlights the issue about awareness and preparedness related to risk and resilience that will be explored in the next chapter.

5.1.2 From national to local: flood resilience in the UK

It is noticeable from the historical analysis of York's response to flooding, that traditionally flood management in the UK has been characterized by a technocratic approach determined by top-down decisions. This approach privileges technological solutions to flood risk such as barrier and pumps, overlooking the social context and local knowledge. The principal organisations involved in flood management in the UK at the national level are the Department for Environment, Food and Rural Affairs (DEFRA) which is responsible for flood policies, and the Environment Agency (EA) which is the main public body operating on issues relating flood defence and advice. According to the EA's 'Declared Policy and Practice for the Protection of Floodplains' (Environment Agency 1997), the principal method to develop long-term management strategies is the elaboration of hazard mapping. These maps contain different layers of information related to boundaries of natural coastal and riverine floodplains, combining recorded flood extents and

computational models of river flooding to highlight potential risk. In their analysis of the institutional framework for flood management in the UK, Brown and Damery (2002) highlight that the strategies adopted by the EA (i.e. flood and risk mapping) are significantly limited as they lack a realistic conceptualisation of the social issues that determine vulnerability to hazard. The EA maps are based on scientific and technical knowledge focusing on quantitative contextual vulnerabilities. Thus, they fail to include the risk perception of the communities which live in those areas. In contrast, this research employs a mapping methodology that provides additional qualitative data via the resilience paradigm.

However, since the severe flooding in the UK in 2007, there has been a paradigmatic shift within the EA towards a more holistic attitude to cope with flooding. Such hazards are recognized as inevitable natural events requiring a resilient approach in terms of preparedness and stronger collaborations between different institutions and stakeholders. One of the first policies which foregrounds a more resilient approach is the 'Flood and Water Management Act 2010 (FWMA)'. This document supports localised and sustainable flood risk management by providing more risk management responsibilities to Local Authorities (LA) via the creation of flood specific county councils and unitary authorities named Lead Local Flood Authority (LLFA) (UK Government 2010). This policy envisages a closer collaboration between the LA and the community affected by flooding in terms of risk awareness and increased involvement in decision-making processes. The implementation of this policy in the City of York Council resulted in the development of a local flood risk management strategy; the Strategic Flood Risk Assessment (SFRA), which identified the following categories of flood risk zones in the city of York (City of York Council 2013, 6-7):

Flood Zone 1: Little or no risk (not coloured)

Annual probability of flooding: <0.1% (less than 1 in 1000-year risk of flooding)

Flood Zone 2: Low to medium risk (light blue)

Annual probability of flooding: 0.1-1.0% (between 1 in 100-year and 1 in 1000-year risk of flooding)

Flood Zone 3: High risk (dark blue)

Annual probability of flooding, with defences where they exist: 1.0% or greater (greater than 1 in 100-year risk of flooding)

This characterisation provides useful information to assist local experts in the development of risk strategies, although it is based on a vulnerability approach and expert-driven assessment of risk. However, following the 2015 flood, major efforts have been made to improve communication and the response to flood risk in the affected community. The EA, in collaboration with the City of York Council, has prepared a Flood Alleviation Scheme focused on ten communities alongside the two rivers Ouse and Foss. The design of the defence scheme was developed after a close consultation with residents and businesses. Furthermore, the EA opened a Community Hub in York city centre to respond to community issues and concerns regarding flooding preparedness and response. This is a significant example of ways to promote major community engagement and learning.

It was interesting to notice in the case of York that the increase in the frequency of flooding led to a shift in response within management institutions from a technocratic paradigm to a more holistic approach, reflecting the resilience thinking discussed in chapter 2. However, alongside the governmental response to flooding, in recent years there has been an upsurge of grass-roots and academic initiatives that foster new debates around and solutions to flood risk. For example, in 2010 the SOURCE Partnership was established in the Calderdale valley to reduce flood risk. This includes diverse charitable and grassroots organisations such as 'Treesponsibility' and 'Slow the Flow' (SOURCE 2020). These charities work in collaboration with local councils and the EA, focusing on community engagement and social learning. Sustainable projects have been proposed to provide long-term solutions to minimise the damage of flooding. For example, the planting of trees to reduce water flow or the construction of water pools and slows to allow "room for

water" during storms. These projects reflect the resilience approach in terms of adapting to risk, offering holistic solutions that respond to environmental issues.

In the academic field during the aftermath of the 2015 flood, the University of York and The York Civic Trust promoted a joint initiative called the 'Resilient York' project (See appendix 7, 7.1, Fig.16). The objective of this programme is to inform and involve York citizens and practitioners in creating a more resilient historic city to cope with the threat of flooding. This is done by developing "tangible initiatives where conservation expertise and good practice can be used effectively to help communities in York following future flooding". This resulted in a one day conference held in York on the 4th of November 2016. The debate, conducted by a panel of local and national experts, focused on issues such as the flood management of historic buildings at the national and local level. It explored academic research and projects related to resilience and cultural heritage and community responses to flooding.

The main outcomes of the discussion are summarised in the following points (Marks 2017, 4):

1. Produce a heritage flooding resiliency 'information pack' for residents.

2. Develop a network of heritage, conservation and craft providers to assist communities in times of disaster (and after).

3. Develop projects that will foster community awareness about flooding impacts (in the past and today) to support vigilance and positive planning for the future.

4. Engage with research into flood effects on historic places and pathways to resilience for their communities.

These resulting recommendations emphasise the need to enhance resilience knowledge within York's community allowing a major dialogue between national,

regional and local stakeholders. A central theme that emerged from the panel debate is the importance of community empowerment through better information and involvement to improve the preparedness and response to risk. It was also noted that action should be extended to insurance companies and planning authorities in terms of protection of cultural heritage by alerting them access to relevant research and case studies of historic buildings' flood recovery.

Another significant initiative which started in York after the 2015 flood is the 'Waterproof Memories' project, promoted by the JORVIK Viking Centre. The museum, built on an archaeological site of the Viking-Age period, was severely affected by the 2015 flooding which damaged the main collection and the electric substation of the museum. Alongside efforts to recover the building and redevelop the collection display from a structural perspective, the museum started an oral history project to record the Jorvik staff and York citizens' memories of flooding. After three months, the research team generated more than ten hours of interview recordings. During my research, with the help of a member of the Jorvik team, I consulted the Waterproof Memories archive to listen to some key interviews. According to their data analysis, the lack of an effective warning about the raising of the Foss Barrier was the main issue that emerged relative to the flood experience of the Jorvik museum staff. The interviews with the EA staff revealed that the communication difficulty was caused by the lack of telemetry data from the Foss barrier. Another emergent theme from participants' memories was the strength and solidarity of the community response towards vulnerable groups of people such as the James Street Traveller Community. Interestingly, concerning future attitudes towards flooding, the Jorvik staff are now more aware about flood risks since resilience measures have been adopted in the building.

The above examples within the social, academic and cultural contexts, provide a range of alternative solutions to the top-down approach which has characterised the traditional management of the flood risk in the UK. Furthermore, it is interesting to note that national bodies such as EA, collaborate increasingly closely with

grassroots organisations placing the community's voice and response at the centre of flood management. These projects combine local and specialist perspectives in flood response, shifting the focus from a technocratic response to learning activities and raising flood awareness among the community.

5.2 The Red Tower: a community project for heritage resilience

A significant example of community involvement in the conservation and recovery of a cultural asset in the city centre of York is related to the rehabilitation of the Red Tower (Grade I listed building). Specifically, I wanted to explore how the community-led 'Red Tower project' has contributed to enhancing the resilience of the building after the 2015 flooding in terms of volunteers' participation and action. In order to achieve this, semi-structured interviews were conducted with the Chair/Director of the Red Tower York (CIC) Barry Beckwith and the architect Geoffrey Holland, director of Holland Brown Architects, the practice employed to redesign the building for community purposes (See appendix 7, 7.1, Figs. 17 and 18). The history of the Red Tower and the creation of the community 'Red Tower project' has been eloquently described in chapter 7 of Foxton's PhD thesis (2018). She conducted a two-year ethnographic study on the Red Tower project, working with supporters, residents and other groups of people connected to the building such as students and 'wallwalkers' (visitors of York and people who walk along the wall). Her study documents the relationship between a heritage project and the level of community collaboration within the place, analysing the different forms of action and engagement.

In January 2015, a group of dedicated volunteers from the 'Friends of York Walls' group created the Red Tower Project which aimed to transform the historic building into a community hub for the city of York that could benefit the local community and visitors. The vision of the project, summarised in the Red Tower webpage, "is to create a multi-use space accessible to residents, visitors and businesses. It will incorporate meeting and events space, café, kitchen and growing

beds, making use of the attractive outdoor space around the building, as well as the two floors of the building itself". The project was supported by over forty people and local organisations such as The Conservation Volunteers (TCV), Morrison's supermarket, CYC and Edible York, a local community charity. Foxton (2018) provides a detailed analysis of the different local values and forms of engagement (i.e. digital and paper) used to involve local people and realise the project. The 2015 flood represented a challenge for the project in terms of continuing the community engagement and adhering to the timescale of the architectural works (Foxton 2018, 316). Nevertheless, according to Foxton (2018, 320) the flood aftermath represented a moment to bring people together, foster social connection and build working relationships. Indeed, as reported in the Red Tower project blog, the flood event helped the team to 'crystallise a plan for the future' adopting a resilient approach. The organisation became a Community Interest Company (CIC), registered as Red Tower CIC in order to provide funding to sustain the long-term project. In 2017 the Red Tower team secured a thirty-year lease from the City of York council (owner of the building) and gained planning approval for the internal upgrade of the building. While previously I presented elements of the local flood culture in terms of building adaptation and policies development, I selected the Red Tower project as an example of resilient practice in the York city centre which includes community participation in the resilient design of the building. The account of these local resilient practices foregrounds the results of my research presented in the next chapter. The following interviews held in 2018 (see Appendix 4, 4.3-4.4) with key stakeholders of the Red tower project aim to describe the collaborative architectural project to enhance the resilience of the building.

5.2.1 The Red tower project and resilience practices

The interview with Barry Beckwith provides an in-depth discussion of the challenges and results faced by grass-roots organizations in managing cultural heritage and adapting to environmental risk such as floods. The main objective of the questions was to highlight the relationship between the local community, the building and risk

of flooding. Investigating the resilience practices adopted within the project, in terms of technical solutions and changing perception and behaviour of the building users, is central for the following discussion. At the beginning of our conversation, Barry explained that the history of the Red Tower is intertwined with the presence of the water and the subsequent threat of flooding. Indeed, the creation of the first tower (probably constructed in timber) commenced with the damming of the River Foss (known as 'King's Fishpond') in 1068 by William the Conqueror. Subsequently, the brick tower was conceived as part of the medieval city wall defences that in addition to the adjacent 'King's Fishpond' assured the city's defence during the reign of Richard III. Although the tower was built in the 15th century, its current condition is the result of heavy restorations and reconstructions after the Civil War attacks on York in June 1644. Additional restoration occurred during the Victorian period when the King's Fishpond was filled in, raising ground levels in the area around the tower. Finally, Barry enthusiastically described the motivation behind the creation of the 'Red Tower Project' in 2015:

> *"The building was used as a council store for building material until the beginning of 2015 when a very knowledgeable lady decided that it was sacrilege to use this building as a council store, so let's open up let's bring new life into it, let's make it available first, above all, for public use primarily for the community but also for anyone, like people that walk along, let them inside let them have a look. Part of that process was to create a pop-up cafe for the community."*
>
> *(BB, Appendix 4, 4.3, 1)*

Bringing 'new life' into the building through a community use and new public function is the root of the overall vision of the project which led to the creation of the Red Tower CIC. The project is characterised by a strong focus on inclusion and access to the local community. However, the 2015 flood represented a threat for the historic fabric of the building and its use within the community. From the interview, it emerged that among the Red Tower team the perception of the flood risk before 2015 was low, as Barry argues:

> *"I joined this group of volunteers in the summer of 2015, they'd already been operating for five or six months prior to me joining them. But the group of people that were operating, some of them were relatively new to York and some of them weren't old enough to remember, when I joined them it was summer time and there was no, it never occurred to me to say to anybody that there's a chance this might flood, it never occurred to me that this could happen but when the floods came, of course then it brought it all back to me the days I used to ride my bike through the floods down here. But it was since the introduction of the flood barrier, they've done a lot of flood alleviation, the river Foss down here one of the main reasons it used to flood down here was its connection to the Tang Hall Beck because the Tang Hall Beck used to flood. So, the Environment Agency put a lot of work into flood alleviation from Tang Hall Beck from the river Foss then created the barrier. So really my historical recollection of the flooding in this area wouldn't really ring true based on the work that had been done since 2000."*
>
> *(BB, Appendix 4, 4.3, 6)*

It became apparent from Barry's contribution that the main elements which have influenced the perception of risk within the Red Tower group of volunteers are related to the familiarity with the area (in terms of new and old York residents), the age of the volunteers, and finally to the EA flood alleviation scheme. Therefore, the memory of past flood experiences, both individual -personally experienced- or collective which contributes to the identity of a group, is crucial for increasing the awareness of flood risk.

Despite the flood damage on the ground floor of the building, testified by the salt efflorescence in the wall and the destruction of the team's belongings, the response of the group to the flooding was marked by resourceful, generous, empathic community actions. Barry describes the recovery process that involved cleaning and drying out with the assistance of other voluntary groups such as the Mormon church of Acomb. The building became a store for donated cleaning

products and a distribution centre for materials and advice. Interestingly, Barry highlights a lack of support from governmental institutions in the aftermath of the event:

> *"We didn't receive any advice on how to clean from the local authority although it was a local authority building"*
>
> *(BB, Appendix 4, 4.3, 9)*

Therefore, it became apparent that the flood response followed a bottom-up process and the prompt response of the community was crucial for the quick recovery of the building. The project for the building designed by Holland and Brown reflects the new awareness of flood risk, thus becoming an example of flood adaptation. However, Barry pointed out that it was difficult to start the building work due to delays on behalf of the City of York Council in providing the necessary utilities (i.e. electricity and sanitation). Thus, the team "had to shout a bit loud and try to encourage and pressure the local authority".

The Red Tower blog (Red Tower York 2018) provides a timeline of the restoration works carried out during the year 2017-2018. Supplementary to this, I visited the building site in October and November 2018 to record the work progress (see Appendix 7, 7.1, Figs. 19 and 20). The project introduces facilities and basic services such as a galley kitchen, bathroom and a function room on the first floor allowing the new community use of the building. The connection with the first floor is provided by a new staircase constructed in metal with timber treads located in the south-east corner of the tower. From analysis of the architectural drawings (see Appendix 7, 7.1, Fig. 21) it is noticeable that these interventions respect the architectural character of the building. Indeed, the proposal is reversible without altering the historic fabric of the building. It intends to improve comfort and accessibility through thermal insulation, double glazing and a new landscape design. The architect Geoffrey Holland points out that the project design was conceived after long consultation with the Red Tower group and local community:

> *"The community were consulted by the client body and I think they did participate providing quite a lot of inputs which formed the original brief that the client came up for it and that is how we interpreted. For instance, the usage of the upper room, there were lots and lots of ideas and the truth is that it has got to be kept as a very simple and flexible space for small meetings and things like that. So, those ideas came forward but it's limited to what can be achieved and hold in terms of numbers. And so, it was inevitable that it's going to be a small simple and flexible space. Downstairs most people would want a small kitchen and a toilet."*
>
> *(GH, Appendix 4, 4.4, 1)*

However, Holland confirms that the 2015 flood had an impact on the original design scheme of the building, leading to the adoption of a resilient approach. This included avoiding any timber material and electric plugs below 1.4 meters, which is considered the risk flood level. He describes his project:

> *"Everything apart from a few stair treads are in metal. All the doors and partitions are in metal and the services are all fed from the first floor level downwards and it is a reversible project."*
>
> *(GH, Appendix 4, 4.4, 3)*

Moreover, the kitchen unit and cupboards are movable with polished concrete worktops to allow quick cleaning and use. In the architectural specification, the finishing for the concrete floor is a durable floor paint to make it more resistant to future flooding. Overall the project increases the response to the risk of flooding by minimising the impact of flood damage to the furniture and fixed elements (i.e. stairs and toilet), adapting the building to be more resilient. However, while the resilience of the building has been enhanced through the new architectural design, Barry and the Red Tower team express the intention to keep the memory of the flood experience alive to foster risk awareness for the users of the tower. Barry told me about one of the activities that they prepared:

> *"I created some panels with the pictures of the flooding. These pictures were taken when the water receded quite a bit. I am going to redo this panel and this will be a constant reminder to visitors. We are planning to have a flood display for the Heritage Open Days, with these pictures and plans of the building."*
>
> *(BB, Appendix 4, 4.3, 7)*

Retaining the memory of the flood is central to build risk awareness within the community and increase their preparedness and risk perception. The materialisation of disaster memory in the architectural environment, through exhibition panels or plaques, is the most common and effective solution to engage with local citizens. Le Blanc (2012) refers to this as 'heritage of the catastrophe' (Le Blanc 2012, 9), in other words projecting on physical material the meaning of the disaster. For the members of the Red Tower project, preserving the memory of the 2015 flood is crucial to foster local identity in relation to the environmental risk and consequently to enhance the resilience of the place. This section concludes the contextual introduction to the local flood culture of York. This encompassed the history of flooding in the city of York, the institutional and policy frameworks, and ways in which these have evolved at a national and local level. The Red Tower case study provides a significant example of a community-led activity that enhances the resilience of the cultural heritage in the historic centre of York. The second part of this chapter is dedicated to the contextual analysis of Amatrice, starting with the analysis of its local seismic culture and its earthquakes history. While new themes and issues will emerge in the following discussion, the structure of the contents will mirror those used in the York section.

5.3 Local Seismic culture of Amatrice

The origins of Amatrice can be traced back to the Middle Ages, founded by the Swabians and expanded during the Angevin reign. The first settlement was characterised by a regular, urban, planimetric system based on orthogonal streets and blocks, echoing the French medieval urban layouts (see Appendix 7, 7.2, Figs. 23 and 24). However, archaeological evidence shows that the area has been inhabited by humans since prehistoric times (Svizzeretto 2005, 17). Amatrice and the surrounding territory benefited from its geographical position since pre-Roman times, as the town was located along the route of the Via Salaria, which was of social and economic importance, providing a link between Rome and the Adriatic Sea. During the Middle Ages, the development of Amatrice is entwined with the war between the French Angevin and the Spanish Aragonese over the predominance of the Kingdom of Naples (Ghisetti 2017). Under the incumbent control of the Spanish Crown the city of Amatrice gained major importance as a centre for minting of currency. However, when the Spanish and French war culminated in 1529, the city suffered from extensive destruction and looting by the French army. Charles V of France then granted the city as a 'fiefdom' (intended as a territory owned by a lord) to his war advisor Alessandro Vitelli (Massimi 1958). In this period the economic, cultural and social authority of Amatrice flourished, and the town including its road system were restored by the famous local architect and painter Nicola Filotesio (also known as Cola dell'Amatrice).

The urban pattern of the historic centre and its buildings, bear testimony to the complex and rich layers of history which contribute to the historic significance of the town (Viscogliosi 2016). The varied cultural heritage has been recorded and illustrated by English artist Edward Lear in his publication titled "Illustrated excursions in Italy" (1846) which contains engravings of the principal religious and civic buildings of the town. The urban layout of Amatrice is composed of densely positioned historic masonry buildings that are aligned along the two main streets namely *Corso Umberto I* and *Via Roma*. According to Fratoddi (2005, 15) the

planimetric system of the 13th century follows the 'triangulation design' of the Mendicant Orders such as Franciscans, Dominicans and Augustinians. Indeed, the most significant churches of S. Francesco, S. Agostino and S. Emidio are located at the vertex of the triangle with the Civic Tower at the centre, 25 meters high, of which the first evidence is documented in the thirteenth century. The medieval historic centre was surrounded by a system of fortifications, accessed through six gates: Porta Carbonara, Porta Castello, Porta San Francesco and Porta Ferrata, some of which still existed before the 2016 earthquake.

Amatrice is historically prone to seismic events, they have been recorded since 1550 (Figure 5.2). These caused severe damage, especially during the 1639,1672 and 1703 earthquakes which destroyed the town (Fiorentino et al. 2018, 1402). Because of the frequent earthquakes, the historic centre was gradually abandoned throughout the 18th and 19th century affecting its demography and economy. Interestingly divergent from the York case study, the population of Amatrice, due to their exposure to seismic risk and economic downturn, has historically abandoned the city centre. The lure of economic opportunities offered by larger proximate cities such as Rome and Rieti, have led to the use of many residential buildings in Amatrice as second homes for the holiday period. However, the seismic event which hit the centre of Italy on the 24th of August 2016, caused a large number of fatalities (298), as it happened during the holiday season. About 5000 permanent residents also became homeless in the Amatrice area. In addition to the dramatic loss of life also the cultural heritage of Amatrice, including the historical fabric of the residential buildings, suffered from the extensive damage caused by the sequence of three earthquakes between August, and October 2016 and January 2017. The economy, which is largely based on agriculture, sheep-farming and gastronomic tourism, was inevitably affected by the tragic consequences of the earthquake leading to further depopulation and abandonment of the territory.

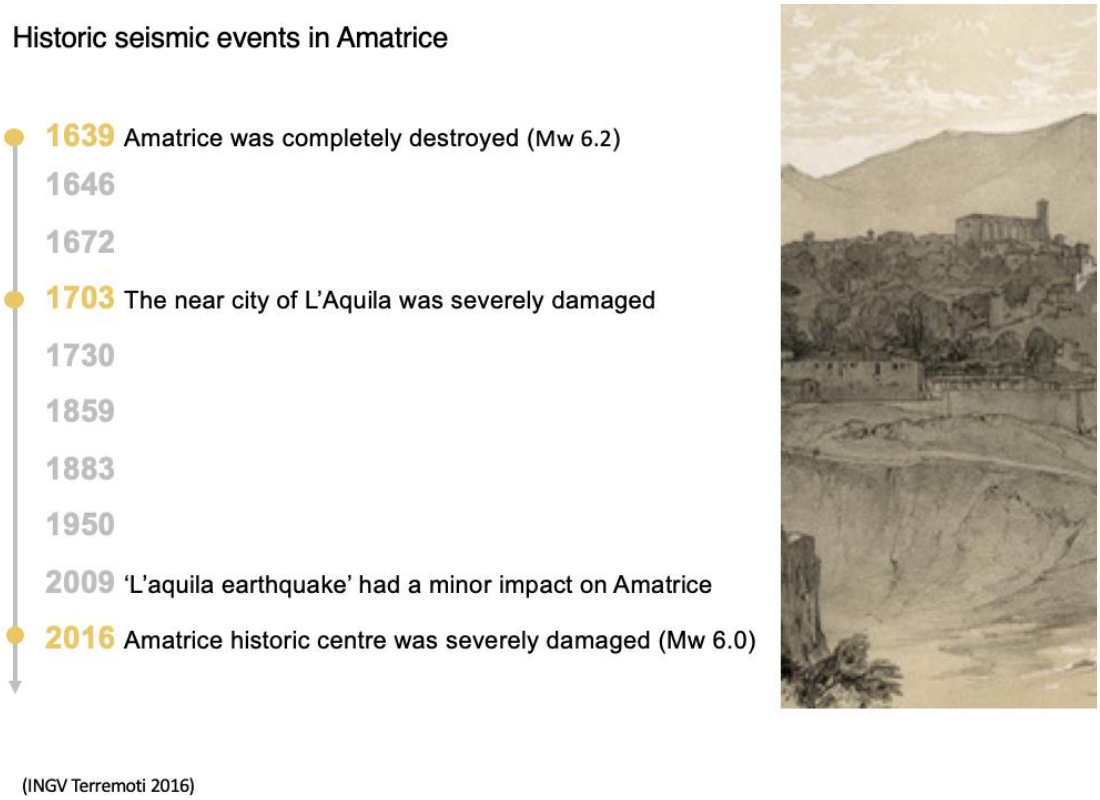

Figure 5.2 Historic seismic events in Amatrice source (INGV Terremoti 2016). *Image: View of Amatrice historic centre 1846 by Edward Lear.*

5.3.1 Back to tradition?

As described in relation to York, the history of Amatrice is also intimately connected to its exposure to natural hazards. This has shaped its social, economic and architectural development. In the previous section I analysed flood-strategies concerned with policy and local practice in response to flood risks and recovery in York. Here I outline the development of Italian anti-seismic building codes and their effect on the conservation and retrofitting of the built heritage of Amatrice. Central to this is the understanding of the local context in respect to constructive traditions, capacities and crafts developed against seismic events. Many scholars, like Ferrigni (2005), suggest that community lay knowledge has empirically developed traditional seismic retrofitting systems able to increase the safety and resistance of historic structures. Typically, traditional construction techniques in different regions have proven to be resilient to seismic damage, as they have several elements that

contribute to good earthquake performance (Jigyasu 2018, 143). These techniques, such as buttresses, metal or timber ties, and structural reinforcement of the masonry wall, form part of the local seismic culture of a place. However, as will be discussed below, historic buildings in Amatrice lack physical evidence of these local seismic cultural practices despite the high seismicity of the centre of Italy and the community collective memory and experiences of past earthquakes. The inadequacy of the constructions in Amatrice clearly raises the question of the value of local building traditions and how to reconcile respect for the conservation of historic features of buildings and the aspiration for structural safety. Lagomarsino (2017, 119) points out that the traditional construction system in Amatrice is unquestionably very poor: the masonry is composed of irregular rounded stones with earth mixed mortar with only a small percentage of lime. Noticeably, the composition of the wall increases the vulnerability of the structure to seismic action, as it lacks cohesive and connected architectural elements. In his analysis, Lagomarsino also noted that the presence of metal ties is limited and made ineffective by the poor anchoring to the stone elements. Similarly, the buttresses often are detached from the rest of the masonry, not providing structural continuity and increasing the damage risk. Therefore, historical techniques in this area which represent the local culture in terms of knowledge and awareness of seismic risk, have proven lacking in effective responses to the earthquake.

Additionally, the high vulnerability of the buildings made of cobblestone masonry was exacerbated by the presence of incongruent retrofitting techniques which privilege the use of concrete elements in masonry structures. Through an analysis of the press photographs of the destruction in Amatrice after the 2016 earthquake, Langenbach (2017) highlights the presence of concrete roof beams and concrete floors inserted in the damaged stone masonry buildings. The different structural behaviour of stone and concrete material and the lack of connection between the different architectural elements exacerbated the destruction of the historic fabric of the buildings (see Appendix 7, 7.2, Fig. 30). These retrofitting techniques reflect the first advances intended to reduce the effect of seismic action

on structures using calculations of the performance of reinforced concrete. Indeed, the use of reinforced concrete was recommended by the Italian building code (DM86) which considered that the structural behaviour of masonry buildings would then reflect that of a robust concrete or steel 'box-frame'. Thus, for the seismic retrofitting of historic buildings the strategies proposed by the DM86 consisted in the insertion of concrete ring beams at the roof level; the use of rigid diaphragms (concrete slabs); the use of mortar injections and concrete encasements and the use of steel ties and rods (D'ayala 2017). The text 'D.M. *dei* L.L.P.P. n.27690' recommends for the adaptation of masonry building the use of concrete ring beams:

> L'ancoraggio alle armature verticali può essere realizzato con l'esecuzione di un cordolo in cemento armato, di altezza non inferiore a quella del solaio in corrispondenza di ciascun orizzontamento oppure con il consolidamento della muratura in corrispondenza degli orizzontamenti mediante iniezioni di miscele leganti armate
>
> (Ministero dei lavori pubblici 1986a)

> *The anchorage to the vertical reinforcements can be carried out with the execution of a reinforced concrete beam, of a height not less than that of the floor in correspondence with each horizontal position or with the consolidation of the masonry in correspondence with the horizontal positions through injections of reinforced binder mixtures*

As Langenbach (2017) points out, most of the historic buildings in Amatrice show evidence of reinforced concrete slabs and beams. These testify to the widespread trust in the concrete reinforcements, typical of engineering approaches in the 20th century. In her publication, Donatelli (2010, 24) traces the evolution of Italian anti-seismic legislations (from 1694 onwards) which were historically developed only after tragic earthquakes. Before 1909, the norms included only a specification that refers to the architecture '*a regola d'arte*', meaning the good construction rules in terms of proportion and dimensions of the different elements. Only after the

earthquake in Calabria and Sicily in 1909, the use of concrete on masonry buildings was recommended as the main reinforcement technique. What emerged from her study on the different legislation is a prevailing attention towards the analysis of the structural vulnerabilities and the risk to which a historic building is exposed. The principal tools used by governmental institutions in Italy today for the safeguarding of built heritage in seismic areas are the *"Carta del rischio"* (Risk map) and *"Schede del rilievo del danno e della vulnerabilità sismica"* (Table for evaluation of damage and seismic vulnerability). The main purpose of these instruments is to assess the vulnerability and damage in the post-disaster phase, providing for a quick response to the earthquake but clearly lacking attention to preventative actions.

However, the Italian building codes, such as the DM86 lack recognition of the specificity of the different structural behaviour of historic buildings compared to new constructions. In this context, the excessive addition of concrete to the historic fabric of built heritage proved to be inadequate, leading to a conflict between conservation and structural safety approaches. In the 1980s, due to increasing seismic damage in Italian historic centres that was compounded by the presence of concrete elements, the need to design historically compatible solutions arose within the technical-scientific community. To overcome the troublesome safety / conservation dichotomy, two types of structural intervention were introduced into the Italian seismic legislation, namely *adeguamento* (adaptation) and *miglioramento* (improvement) (Modena 2016). This represented a paradigm shift aimed to respect the values of the artistic and cultural heritage while guaranteeing safe structural behaviour under "acceptable" seismic conditions. The 'DECRETO MINISTRO DEI LAVORI PUBBLICI 24 GENNAIO 1986' provides the definition for the two terms *adeguamento* (adaptation) and *miglioramento* (improvement) (Ministero dei lavori pubblici 1986b):

- To adapt an existing building means to increase its resistance to the same seismic actions applied to new building constructions.

- To improve an existing building aims to achieve a better degree of security without modifying its original structure.

From this definition, it is apparent that the 'improvement' approach for historic construction includes the recognition of the original constructive system and of its artistic and historic value. Its aim is to reduce the interventions to a 'minimum' in order to align with conservation principles. Modena (2017) points out that the 'improvement approach' is strongly connected with the prevention actions related to the maintenance of the building to mitigate seismic risk. The shift towards a preventative approach based on sympathetic interventions to the built heritage is reflected in more recent Italian regulations such as the OPCM 2008-2011 (Il Presidente del Consiglio dei Ministri 2011). These new norms, elaborated just one year before the L'Aquila earthquake, have acknowledged the limitations to the use of concrete elements in stone masonry buildings. They have led towards the application of preventative measures which preserve the historic structure and historic and artistic values. Consequently, more compatible solutions have been proposed which reduce the mass and weight of the interventions. This includes ring beams made with reinforced masonry or steel and anchored to the walls with steel fibers (FRP); the use of reinforced timber flooring; and FRP strips for vaulted areas (D'ayala 2017). Unfortunately, as Modena (2016) notes, the preventative interventions aimed to increase the safety of a historic building have elevated costs and often involve interventions on adjacent buildings. In addition, the adaptations of historic buildings to the most recent building codes in high seismic risk zones is not enforced by the government as demonstrated in the Amatrice case study. This suggests that a preventative culture and consequently resilience practices are still not an embedded priority in the policies and guidelines highlighted in the Italian case study, showing a deep discrepancy between legislations and practices.

The analysis of the local seismic culture of Amatrice in relation to the Italian building codes has shown that pre-disaster vulnerabilities of the historic centre have inevitably exacerbated the seismic damage. Several contextual socio-economic and

cultural factors have also contributed to the inadequate performance of historic buildings in Amatrice. Firstly, the gradual abandonment of the historic centre over the centuries and the frequent exposure to seismic events has led to the loss of knowledge of traditional practices, namely construction *'a regola d'arte'*. This increased the vulnerability of the historic buildings and contributed to the perceived unsafety of traditional materials such as stone and timber. Secondly, early 20th-century engineering approaches, which supported the adaptation of historic buildings to comply with the safety standards of new constructions, have created new vulnerabilities in the adapted buildings. The events in Amatrice highlight the need for another paradigm shift towards resilient practices based on preventative actions, sustaining communities, and re-discovering traditional knowledge.

5.3.2 Reconstruction: Past Italian experiences and lessons

As previously described, the impact of the two seismic events in August 2016 and the following earthquakes with aftershocks in October 2016 and January 2017, caused heavy damage and the collapse of the entire historic centre of Amatrice. In the aftermath of a seismic disaster such as that of Amatrice, the tragic loss of life is often accompanied by an arousing fear of losing local identity. This is due to the intimate association of intangible traditions with the historic fabric of buildings. An invariably emotional reaction within the community is characterised by a strong yearning for physical reconstruction; spurring fierce debate which contrasts the requirements for safety and the desire for continuity with local traditions and architecture. A study by Clemente and Salvati (2017) refers to the places severely affected by seismic events as "interrupted landscapes" which comprise the urban physical reality and the immaterial values embedded in those places. This, according to Clemente et al. (2017), shapes and builds the identity of such territories as "being the result of long-term anthropogenic transformations and latent socioeconomic processes" (Clemente et al. 2017, 2). While the inhabitants provide meanings and interpretations to those places through their social and cultural activities, the interruption caused by traumatic events such as earthquakes undermine local

identity and collective memory. The present study uses Clemente et al. (2017) definition of local identity as the combination of tangible (physical context) and intangible (historical, cultural, productive values) aspects which form the cultural heritage of a place.

In this section, the main models of Italian post-earthquake reconstruction — namely Belice (1968), Friuli (1976), Irpina (1980), and L'Aquila (2009) — are illustrated highlighting their limitations and achievements. These past experiences in Italy provide a theoretical and operational reference for relating to contemporary issues on how to deal with the reconstruction of the historic centre of Amatrice. The approaches adopted in the Gibellina (Sicily) and in Venzone (Friuli) not only represent polar-opposite ends of Italy but also opposite fortunes relative to the success of the project, and vastly different ideas about community participation and resilience. The Belice earthquake was one of the most powerful in Italian history. It severely affected the east part of the island, in which rural and deprived communities were located. Among these communities the inhabitants of Gibellina agreed to the idea of abandoning their old village which was associated with poverty and insecurity. Therefore, the reconstruction solution proposed was to build a new Gibellina in an area close to the old centre. According to Scibilia (2016) the main reasons that led to this decision, apart from the modesty of the traditional buildings, were the difficulties of reaching the location of the old town, the scarcity of information in terms of documentary and metric data on which to base a reconstruction project, and the pressured demand to provide housing in a rapid way. However, the project for the new Gibellina reflected the inspiration of modernity; combining the English urban model of the Garden City with a single-family housing building typology which was alien to the local inhabitants. During the 1980s, in an attempt to assuage the difficulties faced in acclimatising to the environment, the new city centre became an experimental laboratory for famous artists and architects (such as Gregotti, Purini, Thermes Quaroni, Venezia, Schifano etc). They aimed to 'give identity back to a residential fabric considered abstract and inadequate' (Scibilia 2016, 321). In contrast, the only artist to propose a project for the old city

was Burri, who famously created the *"Grande Cretto"* installation which consisted of a series of white concrete volumes that recreated the path of the streets and squares of the destroyed village. This artistic intervention on the old ruins of Gibellina, strongly driven by an educated elite of politicians, is an example of 'monumentalising the trauma'. It erases the physical evidence of the old village, providing a metaphysical experience of reshaping a place of collective memory with unfamiliar forms. The *Cretto* represents an interruption in the Sicilian landscape (Clemente et al. 2017), which inevitably creates a distance between past and future, crystallising the memory of the traumatic event in an art installation. This, as discussed by Musolino (2017), resulted in a loss of identity and a sense of alienation amongst the previous inhabitants and future generations which have developed a tense relationship with the *Cretto* as it has 'covered' their origins.

On the contrary the reconstruction experience in the city of Venzone (Friuli) is defined by Doglioni (2017) as a "Project of Continuity". It was supported and participated by the citizens of the town and followed the reconstruction slogan *"com'era dov'era"* (how it was and where it was). The methodology for the project carried out by Saratogo and Caniggia was based on guidelines elaborated by Antonio Giuffrè on how to interpret a historic building for its conservation and protection. The first step of the method entails the study of the building types and construction systems, analysing the transformation of the building unity and its variations to understand the collapse mechanisms of the structure. The 'anastylosis' method was used for the reconstruction of principal monuments such as the cathedral, other churches, the town hall, the city walls, towers and gates. For this, primary sources of building data were consulted and the memory of the citizens provided guiding advice. The urban fabric was reconstructed using modern technologies but replicating the same building types. The system of streets and squares was replicated *"com'era dov'era"* conserving the social identity for the community. It is important to underline that the wealthy socio-economic context profoundly influenced the trajectory of the project. This includes the awareness of the inhabitants of the value of their historic centre who powerfully reclaim the

reconstruction *"com'era dov'era",* and the local enterprises and craftspeople involved in the reconstruction process (Clemente et al. 2017). The reconstruction of Venzone is an exceptional model where the expert's critical analysis of building typologies and new design was combined with the community's needs and participation.

Other Italian reconstruction experiences are often placed in between the two examples of Gibellina and Venzone, raising other issues about identity and reconstruction. For example, when S. Angelo dei Lombardi was reconstructed after the Irpinia earthquake, it retained its medieval urban pattern but used modern technology and materials without using a typological study as in Venzone. This led to a hybrid solution between modern and old that negatively influenced the relationship between the citizens and the historic centre, undermining their local identity. The recent and ongoing L'Aquila reconstruction presents different layers of complexity that are entwined with the bureaucratic, political and corrupt reality of the Italian government as described by Alexander (2019). As already explained in the introduction of this thesis, in the aftermath of the earthquake, the interventions and management of the crisis were characterized by a top-down approach reinforced by the presence of the military and the Italian Civil Protection in the so-called 'red zone' of the historic centre. To respond rapidly to the housing problem, the Government promoted a program named 'Complessi Antisismici Sostenibili ed Ecocompatibili (C.A.S.E.)' (Earthquake-proof Eco-Compatible Housing Complexes).

Overall the project included the construction of 19 new settlements, designated as 'new towns'. While the experimental project of CASE provided temporary housing in a short enough time to avoid the depopulation of former inhabitants from the historic centre, this was an expensive investment that isolated and deprived inhabitants from primary and commercial services. This has affected the 'sense of community' in terms of their collective experience and memories, causing psychological distress and alienation, ultimately undermining their cultural and local identity. However, the ongoing reconstruction of the historic centre of

L'Aquila, started in 2012, has systematically recovered the main religious and civic buildings as well as the residential dwellings (defined as *aggregato edilizio*) which are significant for restoring the cultural and historic identity of the community. The reconstruction, carefully led by the Superintendency for Archaeological, Artistic and Architectural Heritage and Landscape for L'Aquila, is defined as a laboratory of study and experimentation for heritage conservation (Vittorini 2017). An example of this experimentation is the restoration of the 13th Century Basilica of Santa Maria di Collemaggio, which in 2020 was granted the prestigious European Heritage Award. The project was considered as a noteworthy model of conservation and consolidation, respecting the original fabric and experimenting with sympathetic retrofitting and design technology. The comparison of these different case studies in Italy highlights that reconstruction issues gravitate around the themes of economy, seismic culture, risk awareness, geographic location and community participation. As shown by the L' Aquila case study, acknowledging the value of cultural heritage as a driving force for cultural and social growth, supported and promoted by citizens and institutions, is key to starting a successful reconstruction process. Another consideration is about the often-overused slogan *"com'era dov'era"*. While the representative case of Venzone is proof that a faithful reconstruction is difficult to attempt, it encourages a critical reconstruction which includes local knowledge and expertise.

Concerning the reconstruction of the historic centre of Amatrice, in earlier seismic events in the 17th and 18th century, the local population rebuilt the buildings in the same area maintaining connections with the traditional urban layout. Conversely, the "*tout-court* demolition" (Gizzi 2018) that took place in Amatrice after the 2016 earthquake is said to have led to a loss of identity and the subsequent depopulation of the community (see Appendix 7, 7.2, Figs. 25 to 29). The previously mentioned study conducted by Clemente et al. (2017) shows that fragmentation of community identity in the post-earthquake reconstruction phase is a common phenomenon that has occurred in several urban centres in Italy. According to his analysis, the population who survived the seismic event experience different phases

of “estrangement” from their territory, caused by the deprivation of their home and the long duration spent in temporary accommodation. The sense of “estrangement” or alienation is caused by the physical displacement and consequent loss of identity. This results in the fragmentation of the memories and emotions linked to a place, which causes a disruption of habitual social relations and the progressive abandonment of those places. In the Amatrice case study chapter I will refer to the Venzone *“com’era dov’era”* reconstruction, highlighting the methodological process that was applied to study and conserve the traditional construction system while remaining in alignment with current building code regulations.

Carbonara (2018) discusses another factor which led to the indiscriminate demolition of the surviving walls of historic buildings in Amatrice. This relates to the distinction adopted by institutional bodies between ‘major architecture’ (churches) and ‘minor architecture’ (the historical fabric composed of houses, road layout, squares and common urban spaces). This differentiation is rooted in the debate that arose during the post-World War II reconstruction period in which conservation regulations such as the Venice Charter focused on the value of the individual monument isolated from its context. Despite this being an outdated conception of heritage, in Amatrice only the high-status buildings, including the most important churches, the historic civic tower and part of the local museum were promptly conserved and secured through propping construction. Conversely, the buildings that composed the medieval urban pattern of the city, because of their ‘minor’ value were demolished. These aspects portray the multi-faceted context of my case study presented in chapter 7, showing the different levels of complexity related to the reconstruction process after an earthquake. In contrast with the top-down approach which characterised the demolitions of the historic centre of Amatrice, in the following section I present a grassroots activity in response to the earthquake named ‘*Comitato 3e36*’ and an interview with one member, Mario Ciaralli (see Appendix 4, 4.9). This represents a corresponding case study to the Red Tower project for York, illustrating a different example of local activism after a disastrous event.

5.4 Community actions for rebuilding identity

In the wake of the Amatrice earthquake, a group of citizens promoted a bottom-up initiative called '*Comitato 3e36*'. The name refers to the precise time during the night when the first seismic event occurred. According to information gathered from their website, the Committee intends to propose a new democratic and participatory culture based on the following principles: "legality, public ethics, transparency, informed judgment, citizens' leadership, active listening, spirit of service, and institutional respect" (Comitato Civico 3e36 na). Throughout the period after the earthquake, public assemblies open to the whole local population were organised to recreate a meeting place for citizens with the aim to support the community. Moreover, the '*Comitato 3e36*' intends to play an active role during the reconstruction phase by conveying citizens' proposals and requests to governmental institutions, and documenting "their precious personal, collective and historical memory of places". Crucially, one of the main activities of the group of volunteers was to support the protection and recovery of damaged cultural heritage after the earthquake. The Committee's interest in the recovery of the historic buildings and artefacts is connected to the need for safeguarding the local identity of the community. Indeed, the committee in one of their press releases (dated 14 February 2017) expressed that their identity is rooted in the cultural and artistic physical expressions of Amatrice's heritage (Appendix 8, 8.1):

> L'identità di una popolazione affonda le sue radici anche e soprattutto nel patrimonio storico, artistico e culturale costruito nel corso dei secoli.
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> *"The identity of a population has its roots also and above all in the historical, artistic and cultural heritage built over the centuries."*

The main means of communication with the responsible institution, the MiBACT of Rome (Ministry of Cultural Heritage and Activities), is the "open letter". The first was

sent on the 20th of January 2017 after the last earthquake that caused severe damage to surviving buildings. From the letter (Appendix 8, 8.2), the frustration of citizens emerges with regard to the neglect and superficiality with which the MiBACT has dealt with the emergency. They argue a lack of timely intervention capable of being able to save the architectural and artistic heritage. The '*Comitato 3e36*' listed the different heritage in terms of paintings, statues, sacred objects, relics, bells, frescoes and entire buildings, which were exposed to severe weather conditions and future seismic events. Finally, with a powerful message, they suggested to the institution to collaborate with the local people and connoisseurs of the territory:

> Lasciate spazio ai tanti volenterosi che hanno sinceramente a cuore le sorti del patrimonio storico-artistico della conca Amatriciana; avvaletevi della loro collaborazione, "approfittatene". Affiancate loro personale qualificato e dinamico: resterete sorpresi della partecipazione e soddisfatti dei risultati.

> *"Make space for the many willing people who sincerely care about the fate of the historical-artistic heritage of Amatrice; make use of their collaboration, "take advantage of it". Support them with qualified and dynamic staff: you will be surprised by the participation and satisfied with the results."*

From the online consultation of the '*Comitato 3e36*' archive of events (period 2017-2020), it was possible to record six initiatives that have been dedicated to the protection of cultural heritage. This entails debates, open letters to the MiBACT, and conferences with specialists such as the historian of architecture Prof. Alessandro Viscogliosi and the architect Stefano Boeri. Arguably, from the nature of the events proposed by the committee, establishing a direct communication between citizens, experts and the representatives of different governmental institutions is central for the reconstruction process of the historic centre. Moreover, the importance of local knowledge is highlighted to assert the value of heritage and define the priority of

interventions. Important themes that emerged from the interview with a member of the '*Comitato 3e36'* named Mario Ciaralli provide an insight into the citizen-led initiatives that arose in Amatrice after the seismic events. Mario's passion towards the tangible and intangible heritage of the town, led him to open a cultural association in the historic centre called '*Cola dell'Amatrice,'* in which he conserved documents and artefacts relative to the history of the city centre. Moreover, the association, located in the main street of the town *Corso Umberto I*, was used as a space for meetings and cultural debates. While the earthquake has destroyed such an important social and cultural space, Mario's active dissemination and preservation of the history of the city did not stop, as shown in the following section.

5.4.1 Understanding resilience through citizen's actions

The interview with Mario Ciaralli was held in his antique store in the historic centre of Rome on the 30th of April 2019 (see Appendix 7, 7.2, Fig 36). In the shop, he conserves all the surviving books, paintings and historic photographs which form part of Amatrice's documentary memory. At the beginning of the interview Mario described the motivation which led him to start a grassroots movement to protect damaged cultural heritage. A couple of weeks after the first seismic event, he noticed that no organisations had actively committed to the recovery of tangible heritage, in terms of providing safety consolidation to the damaged structure of the main churches, such as S. Francesco and S. Agostino. Through social media, in particular Facebook, Mario created a group called *"Prima che sia troppo tardi"* (Before it is too late) dedicated to helping the MiBACT in the recovery of the objects of art missing after the earthquake. According to Mario, the staff of the MiBACT showed limited knowledge of the movable heritage located in the historic buildings of Amatrice. This was compounded by the lack of a continuous presence in the territory by the MiBACT specialists. Mario points out that they were coming to Amatrice just once a week from Rome, whereas other institutions had a permanent hub in the city centre. He accuses them of being: "Owners of the territory without knowing what they were going to see". This enraged comment highlights the

complex relationship between governmental institutions and the local community within the Amatrice territory, and the lack of cooperation and public engagement. It is possible here to point out a profound divergence with the institutional response in York after the 2015 flood. Indeed, as noted above, the EA created a hub in the historic centre, showing an openness toward the local population by decreasing the physical distance of their offices.

Mario's efforts and his call for participation were not heard by the institutions, leading to the failure of this grassroots activity. Mario states:

> *"Purtroppo questa iniziativa dal basso non ha avuto successo. Quindi sono andato da solo a recuperare oggetti d'arte dove possibile (tabernacoli, statue, candelabri ecc). Ma nessuno mi ha aiutato, né l'amministrazione comunale né i cittadini" (MC, Appendix 4, 4.9, 2)*

> *"Unfortunately, this bottom-up initiative was not successful. So, I went alone to recover art objects where possible (tabernacles, statues, candelabra etc.). But no one helped me, neither the municipal administration nor many other citizens."*

Through analysis of Mario's Facebook page, it is possible to consult his systematic record of photographs which depict the extent of the damage incurred after the seismic events. Moreover, the architectural elements that constitute the constructive tradition of Amatrice are presented, such as the typical *palombelle* roof beams with decorated bricks (see Appendix 7, 7.2, Fig 37). According to Mario, these objects should be recovered and reintegrated in the reconstruction process of Amatrice, testifying to the complex history and cultural value of the town. Mario's record of photographs and his knowledge of Amatrice's heritage resulted in a joint publication with the '*Comitato 3e36'* titled *"AMATRICE E FRAZIONI, CHIESE - CASE - PALAZZI storia di una morte annunciata" ("AMATRICE AND FRACTIONS, CHURCHES - HOUSES - PALACES story of a death foretold")*. The small book (see

Appendix 8, 8.3) contains a rich selection of pictures and descriptions of the varied artistic heritage located in the Amatrice territory, showing the damage caused by the 2016 earthquake. The objective of the publication is to safeguard and recover the little-known artistic and historical artefacts deemed "minor", such as portals, crests, keystones, worked sandstone ashlars, architraves, engraved stones and so forth. The authors fiercely denounce the lack of urgent interventions to assure the safety of the assets at risk of collapse. Indeed, most of the measures lack preventative approaches: recovering only already severely compromised and damaged assets. Finally, Mario's voice was amplified by an open letter signed by the majority of the citizens of Amatrice included in the last section of the publication. In the letter, they lament of the "disconcerting and irresponsible inattention towards the monumental heritage of Amatrice" by the MiBACT.

During the interview, he explains that the damage to the built heritage has been exacerbated by the slow institutional response to the emergency. He provides some examples, describing that because the baroque altar in S. Francesco was not rescued after the 24th August earthquake it was subsequently destroyed by a collapse of the nave of the church on the 30th October 2017. In the same way, the 13th century frescos located in the S. Agostino church were not protected and suffered greater damage by the following earthquakes. Mario points out that the individuals from the fire department, dedicated to the rescue of artistic objects, could not prioritise the rescue interventions as they were not aware of the value of the local heritage. Mario told me an anecdote that he saw a fireman save a 19th-century painting with little community value instead of focusing on the high value medieval objects and paintings located in the church. This demonstrates the unpreparedness of the people involved in risk management and the lack of collaboration between the institutions and the community. Mario claims that the reason for the delayed response from governmental and religious institutions is caused by a lack of awareness, leading them to consider the value of Amatrice's heritage as *'minori'*. His perception of less high-status buildings is aligned with the argument expressed by Carbonara (2018) in his study on the monumental heritage of Amatrice, in which it

is pointed out that the distinction between minor and major architecture is outdated and does not reflect the current international definition of heritage. Mario affirms that:

> *"I nostri beni culturali sono considerati 'minori'. Mentre l'amministrazione comunale si non si è interessata per la salvaguardia degli stessi. Infatti anche nei poli commerciali non vi è uno spazio culturale per promuovere l'arte locale. Non c'è stato un coinvolgimento della popolazione, e della gente che conosce la storia di Amatrice ma non è stata interpellata." (MC, Appendix 4, 4.9, 6)*

> *"Our cultural assets are considered 'minori'. While the municipal administration did not take an interest in safeguarding them. In fact, even in the commercial centres there is no cultural space to promote local art. There was no involvement of the population, and the people who know the history of Amatrice were not included."*

The demolition of the damaged historic buildings and loss of artistic objects undermines the pride and sense of local identity held by inhabitants of the historic centre. This has had a great impact on the reconstruction process as well; as without symbols of local heritage such as churches and historic architectural elements, the territory is deprived of its meaning. As previously discussed (Clemente et al. 2017), one of the consequences of severe destruction is the sense of "estrangement" of the population, who become more inclined to abandon the town. Mario provides an interesting response to the indiscriminate demolitions that occurred in Amatrice after the earthquake:

> *"C'è stata un'apatia totale. E non so quello che si è recuperato. Intorno a un monumento tu puoi ricostruire la città, invece purtroppo non ci sono più punti di riferimento. Io vorrei rivedere Amatrice com'era e dov'era, ovviamente antisismica come è successo a Venzone. A me è passata pure la voglia: senza i riferimenti storico artistici." (MC, Appendix 4, 4.9, 5)*

"There was total apathy. I don't know what has been recovered. Around a monument you can reconstruct the city, but unfortunately there are no more landmarks. I would like to see Amatrice as it was and where it was, obviously antiseismic as it happened in Venzone. However, I want to give up: the historical and artistic references are no longer there."

Therefore, "*com'era e dov'era*" reconstruction is motivated by the desire to maintain the valuable elements which preserve the historic and artistic character of the centre. Mario argues that the population of Amatrice was already fragmented before the earthquake, and not interested in intangible heritage and traditions such as the '*cantabraccio - le ciaramelle - i riti funebri* and *l'ottava rima'.* He claims this is due to the post-war depopulation, explaining that in the 1950s the inhabitants of Amatrice left the historic centre to find better living conditions in the bigger city, abandoning the territory and its traditions. Concerning his understanding of the concept of resilience he concludes:

"Bisognerebbe iniziare dalla politica e responsabilizzare i giovani. Responsabilità è resilienza. Dobbiamo darci da fare per Amatrice. Purtroppo non c'è più niente è solo terra battuta. Questo mi angoscia. Non bisogna ripetere le stesse tecniche costruttive, perché hanno utilizzato sassi di fiume legati con la terra. Però riproporre la stessa volumetria colori, ed elementi architettonici." (MC, Appendix 4, 4.9, 8)

"We should start from politics and empower young people. Responsibility is resilience. We must work hard for Amatrice. Unfortunately, there is nothing left, it's just beaten earth. This anguishes me. We must not repeat the same construction techniques; in the past they used river stones linked to the earth [cobbles with earth mortar]. However, we should propose the same colour volume and architectural elements."

Therefore, the concept of resilience for Mario assumes a meaning of responsibility and commitment defined by public participation and action. Both the initiatives supported by the '*Comitato 3e36'* and the grassroots activities of Mario underline the importance of transparent communication between institutions and citizens. Lay knowledge is also something that should be integrated in the recovery process, not only in terms of traditional construction techniques and local history, but also by understanding the significance of community heritage values.

5.5 Conclusion

This chapter provides an overview of both case studies, highlighting the differences and similarities in terms of local disaster culture and resilience approaches. In considering the contours of local disaster culture, it is apparent that several aspects -from a national and local level- influence its development within the community. In both cases, the local disaster culture changed over time in terms of risk awareness and disaster memory. Several factors influenced the change in risk patterns and adaptations in the two case studies. Firstly, despite the historical, cultural and economic importance of the two historical centres in the past, the progressive decline of Amatrice has evidently compromised its local seismic culture in terms of construction techniques and anti-seismic measures. In contrast, in the historic centre of York, the different exposure to flood risk in different areas, particularly along the Ouse and the Foss, has led to different levels of preparedness and response to floods.

Another aspect that emerged is how the extent of awareness and pride of the local community and institutions in the values rooted in cultural heritage impacts its conservation and recovery. In contrast to the York case study, the governmental institutions and a section of the population consider the cultural heritage of Amatrice as 'minor', showing a lack of awareness and knowledge of its significance. This has led to poor disaster management characterised by extensive demolitions and delays

which have exacerbated earthquake damages, as shown in the case of S. Agostino church. Indeed, there is a profound divergence between the institutional responses in York and Amatrice during the immediate recovery phase. The approach of the EA, creating a hub in the historic centre of York, reflects an openness towards dialogue with the citizens and a willingness to foster transparent communication. On the contrary, the absence of MiBACT in the Amatrice territory was perceived by local members of the community as a lack of interest in the protection of the damaged built heritage. As demonstrated by Mario's citizen-led activity, MiBACT failed to collaborate or consult with experienced people from the local community, who possess the knowledge and means to understand the significance of local cultural heritage.

In conclusion, this chapter frames the local disaster response of the two historic centres within their national-historic and legislative contexts. Regarding the integration of resilient thinking into national policies, in the UK the trajectory from a technocratic towards a more bottom-up approach is now enacted through increasing levels of community engagement. The involvement of local authorities in risk management has facilitated preventative actions and projects, providing a more tailored response to flood risk. Nevertheless, the EA's territory analysis instruments, such as risk maps, rely exclusively on technical knowledge. This supports the need for new research into providing an alternative mapping methodology which, in contrast, employs additional qualitative data and is focused on local contexts and knowledge. In Italy, the practical and theoretical challenges related to seismic reconstruction present a more complex picture that is influenced by local contexts and by citizen participation at the institutional level. Recently introduced Italian building regulations show moderate intention to preserve the historical and traditional character of built heritage, while maintaining the values of local identity. However, the reality of applying resilient practices and preventive measures in Italian historic centres is characterised by arduous bureaucratic processes and economic limitations. This results in a profound gap between legislative developments and retrofitting practices.

A compelling insight emerged from the comparison of the grassroots activities in the two historic centres after the natural cataclysms. It became apparent that the population's commitments are entrenched in the recovery of neglected heritage, which is an expression of resilient thinking in terms of recovery and transformation. As demonstrated in the reconstruction of Venzone, the active participation of the citizens assured continuity with the past, in its tangible aspects and also intangibly by preserving traditional construction knowledge. Reflecting on the theoretical framework outlined in chapter 3, it can be argued that continuity with tradition is, therefore, an essential aspect of resilience, which allows the community to connect and take ownership of local cultural heritage. However, a resilient community needs to be supported by governmental institutions, which can in turn facilitate the development of grassroots projects. Exemplary is the case of the UK at the national and local level. The continuous dialogue between the local authorities and key stakeholders, regarding the rehabilitation of the Red Tower, has been crucial for the success of the project. In the UK, different grassroots projects are sustained by national and local governmental organizations, facilitating access to technical information and specialist consulting. Conversely, the top-down dialogue between institutions and citizens in the case of Amatrice provoked apathy and frustration among the citizens, resulting in the formation of local grassroots movements. However, the local knowledge held by the leadership and individual activists in these groups was ignored by the local and national authorities. This situation shines a light on an imbalanced power dynamic between "legitimate" (specialist or authoritative) and "illegitimate" (lay) knowledge. It is arguably this dynamic, and the feeling of disempowerment, which ignites local dedication to the conservation of local heritage values.

The comparative analysis of the two historic centres clearly shows the different local disaster cultures and adaptation practices. In York, in line with UK policies on flood risk management, it is deemed essential to increase awareness of flood risk and memory within the local community. While in Amatrice, the erroneous

perception of less high status built heritage caused an unconsidered demolition, meaning that the recovery of local values is central but problematic to its future reconstruction. The question is, therefore, whether the PGIS method developed for the two-case studies can assist in rehabilitation, contribute to local disaster culture, and clarify how the perception of resilience changes depending on context. The following chapters examine the implications of qualitative mapping methods to the development of resilient approaches in terms of practical solutions and defining heritage values from a community perspective.

6. Understanding the resilience of York historic centre

Over the past decades, the concept of resilience has been introduced into DRM. To recap here, this is in contrast to the traditional techno-centric approach which only focuses on vulnerability analysis. Since the promotion of the Hyogo Framework for Action 2005 - 2015 (HFA), the UN also supports a community-based approach to capacity building and resilience improvement. In addition, the recent Sendai Framework for Disaster Risk Reduction 2015-2030 also notes the importance of protecting cultural heritage, using the (newly popular political) slogan "build back better", in which the concept of resilience is embedded. Stemming from this notion of adaptability, the objective of this chapter is to interrogate the notion of resilience in the local context of the York historic centre. This process has been carried out by developing maps that enhance social learning and record intangible aspects of the flood experience (i.e. risk awareness and perception). To reflect this shift in institutional approach, the following case study has been investigated through the lens of resilience. It has been conducted in terms of anticipation, planning and response to disaster risk. The research aims to record the York community's tangible and behavioural response to identify possible ways to holistically describe and visualise resilience.

This chapter begins with the analysis of qualitative data gathered during fieldwork in York using methods described in chapter 4. It presents findings from each of the research activities. These include the 2018 focus group and the questionnaire-based survey proposed to residents and businesses of selected areas along the river Ouse and Foss. The use of PGIS is then explored through the construction of the online map to display the collected data. The mapping experiments in an original way with creating a platform in which tangible and

intangible elements of the local flood culture of York are recorded in relation to the spatial data. This was made publicly accessible to promote public participation in exploring the plural meanings of resilience and how their actions contribute to it. Finally, in the last section of the chapter, I propose an assessment of resilience for historic buildings affected by floods, using mixed methods to provide an alternative framework capable of integrating the more traditional vulnerability assessment. The chapter establishes a solid framework in which the concept of resilience is investigated and represented by drawing upon the research findings of activities such as the focus group and questionnaires.

6.1. Summary of the focus group in York historic centre

This section summarises the outcomes of the 'Building York Resilience' focus group, held at the University of York on 29 August 2018 with a range of local stakeholders (see section 6.1.2). The focus group discussion was concerned with understanding how resilience is perceived and applied in the city centre of York after the 2015 flood. As discussed earlier, the definition of resilience is closely related to the contextual aspect of a place and is expressed in social, political and cultural responses. The group constructed their own meaning of what 'resilience' is in the York context, drawing on the personal flood experiences and memories of the participants. Interestingly, the discussion revealed a general understanding of the 'local flood culture' of the city of York, in terms of how people and buildings have adapted to flood risk. While the local flood culture informed the conversation about past adaptation and risk mitigation measures, the group was also asked to comment on the need for future resilient measures -both physical and behavioural- according to the geographical location of the building and its previous flood history.

6.1.1. Objectives of the focus group

The focus group discussion was undertaken to collect and share individual experiences of the 2015 flood in York, focussing on the disaster response of the

community and their relationship with local organisations and institutions. Moreover, participants were asked to compare the 2015 flood with previous flood experience in York. This foregrounded a discussion about the local flood culture and the importance of transparent and direct communication in every phase of the disasters between the different stakeholders involved. The objectives designed for the focus group were as follows:

- To record community perception of the risk and preparedness
- To discuss the main issues caused by the flooding
- To identify aspects of the York local flood culture
- To explore ways of adaptation –both structural and behavioural
- To define resilience

6.1.2. Participants

The group was composed of seven participants, including six members of the York Civic Trust, with a range of voluntary and professional roles in the community, and the Clerk to The Company of Merchant Adventurers of the City of York (CMA). The York Civic Trust (YCT) is an independent charitable organisation which aims to protect and enhance York's architectural and cultural heritage. The Merchant Adventurers are also an independent charitable institution. As the owner of a medieval guild building which was badly affected by the 2015 flood it was able to represent an interesting case study of adaptation and resilient practices.

All the participants are actively involved in the protection and management of the historic buildings of York which provided homogeneity to the group in terms of knowledge of the heritage issues in flood areas. Moreover, the group represents people who are interested in local flooding, or had been affected by the 2015 flood or had a memory of historic flood. In general, the level of expertise and passion for the topic expressed by the participants was outstanding. While the composition of the group varied in age (from 30 to 60), bringing therefore different generational

perspectives, the gender composition was predominantly male. Following the AHEC ethical guidance, at the beginning of the workshop, the participants were assured of their anonymity in the documentation of the focus group. However, demographic and personal attributes are shared.

6.1.3. Structure of the focus group

The focus group was structured in three-parts, which lasted one hour and a half and tape-recorded. After an introduction from the researcher, in the first part the participants shared their personal experiences or those of other residents in the community related to the 2015 flood or previous flood in York. The second part of the workshop aimed to explore how the participants perceived the meaning of resilience. The groups addressed the following questions, writing their answers on post-its:

- What does resilience mean for you? And how was this applied to your building?
- Do you think York has proven resilient? Could you suggest measures to build resilience at the building but also community level?

Finally, the interactive map 'Mapping York Resilience', performed with ArcGIS online, was presented. The group was divided into smaller groups providing a laptop with each to allow the interaction with the online map. Their feedback was recorded focusing on the advantages of using the app in an historic city such as York too to engage the community and enhance resilient behaviours.

6.2. Results of the participants' experiences after the 2015 flood

The focus group considered local and individual stakeholders' experiences during and after the 2015 flood phases and participants were included in the group regardless of whether they were directly affected by the flood or not. The discussion provided an interesting picture of how resilience is perceived and managed in the city of York concerning its flood risk exposure. The themes which emerged after the coding activity (see Appendix 4, 4.1) were risk awareness, preparedness, communication, recovery and response. It is possible to imagine the local flood culture as an umbrella that overarches these themes which are all elements that shape the flood culture of a place and enhance its resilience. Thus, the analysis of the issues connected to the participant's experience informs the relationship between the community and flood risk in the different hazard cycle phases: before; during and after.

6.2.1. Understanding the causes of the flooding

Understanding the causes of the flooding is central in order to enhance the discourse around resilience within the community. The participants discussed the responsibility of the flood damage among the different stakeholders including governmental bodies. There was a common agreement among the participants that the technical failure and poor maintenance of the Foss barrier, was the main cause which exacerbated the damage of the flood in York. The timeline of a disaster event was also identified as having an impact on the response and damage. P2 (male, member YCT) highlights the complication for intervention due to the holiday period. There was a clear view that the structural inadequacy of the barrier for sustaining the significant rainfall indicates a lack of resilient design elements which overlooks long-term climate change effects. Indeed, it is crucial to clarify that for the participants the main cause for the flooding was the poor management of the Foss Barrier as powerfully articulated by P4 (female, member YCT) who argues that:

"In the case of York there is this mythology that the common enemy

was the water, instead was a failure of the State, whether it was a single engineer or government failure of managing the risk."

(P4, Appendix 4, 4.1, 35)

In her contribution, the participant opposes the general opinion that excessive water is the main cause of the flood (see questionnaire results), stressing that responsibility lies with experts, including national and local authorities, for how they manage the risk. Moreover, the comment implies that the complete dependence on technical measures was ineffective. This view suggests that there are different understandings among the local community about the nature of the risk and who is responsible for managing it.

6.2.2. Risk awareness and preparedness

From analysis of the discussion, it is possible to highlight different kinds of risk awareness: the one derived from the past flood experiences, the one related to the current risk and the one associated to future risk scenarios. All the participants referred to historic York floods, especially in 1982 and 2007. These previous experiences informed the community about the risk of flood and on ways to tackle it. However, P1 (male, member of YCT), remembered when he worked as Environment Director in the Government Office in 2007, underlining that every flood event has variable causes and issues, and the proposed solutions should be addressed depending on the given circumstances.

Whilst the response of every single flood is determined by contingent elements and therefore it is difficult to provide a single guideline or set of solutions, participants indicated that past flood experiences can contribute to enhancing local food culture through risk awareness and preparedness of the community. An example of this is provided by P4 (female, member of the YCT) who states:

"I moved to York to Huntington Road in 1984 in the aftermath of

the 1982 flood, and there is quite a lot to say about the way in which it galvanized the community. So, I certainly wouldn't have found such a strong community to go and live in if they weren't being an object of political focus, which was in the aftermath of the flood, and I was still there in 2015."

(P4 Appendix 4, 4.1, 2)

From this quote, she noted that the community in Huntington Road where she has been living since 1984, has proven to be 'strong' and 'galvanized' during the 2015 flood because it was previously affected by the severe 1982 flood. It is therefore established that past flood experiences and memories of the disasters enhance the risk awareness and the preparedness of a community, embodying attitudes and behaviour of living with the flood threat.

From the discussion, it became apparent that the risk awareness greatly influenced the response during the 2015 flood. In addition, it has been noted that the exposure to the risk is another factor that has influenced the community response. As discussed above, previous flood experiences had a great impact on timely response and mitigation of the damage. Similarly, participants who lived in the centre of York, realised immediately the severity of the hazards, comparing the rise of the water level to the previous flood that they could recall in personal memory. For example, P3 (male, member of the YCT) stated:

"My experience with the Boxing Day [2015] floods were influenced to some extent by a previous flood and I remember I was cycling home from the Kings Manor, and when I approached my house the water was getting deeper and deeper and was just on the top of the curbstone of the street"

(P3 Appendix 4,4.1, 17)

It is evident in participant's observations that physical architectural features (i.e. walls, staircase, windows, fences) or landscape elements (i.e. curbs, streets and

bridges) represent an indicator for people to understand the severity of the flood. Through their past experiences, participants have to some extent developed a capacity to self-assess the risk using visual analysis. Various contributions refer to the fact that the recognition of the risk of flooding was first made by observing the change in the level of the river near their home. During the 2015 flood, P2 (Appendix 4, 4.1, 8) refused to evacuate the house as recommended by the military as he explained: "I knew that we were above the flood level so I said no I don't want get out." He explained that he had acquired this knowledge through his flood experiences of the 1970s and 1980s, in which his home had been subject to floods. P2 marked the level of height reached by the water and estimated that his basement was of a sufficient height to avoid damage to the top of the building. This local knowledge has proven to be fundamental to mitigate the damage in the 'during' and 'aftermath' phase of the flood, but also in terms of community empowerment to be able to decide and not identify themselves as the only victim of a disaster.

The discussion indicated that while the local flood culture is a product of risk awareness and preparedness derived from local present and past experiences, the comparison with other flooded cities was also a recurrent theme in the conversation. I will refer to this as a 'cultural flood parallel', or more in general to 'cultural disaster parallel'. In this thesis, this definition is used to refer to the knowledge of other flood (or seismic in the Amatrice case study section 7.2.4) experiences from a national and international perspective and indicates the capacity of the participants to relate their own local and personal experience to wider contexts. The flood impact and response in the nearby cities of Selby and Hull, and the experiences in other British towns such as Tewkesbury, provided some interesting examples of comparison with the York flood event. For example, P2 refers to historic flood picture of Selby to explain the relationship between the city and its flood level:

> *"I remember the floods in the 70s when York and Selby area was extremely flooded. I remember aerial photos of Selby that was completely flooded except for the church and the graveyard that was above that critical level. The aerial photographs clearly show the historic pattern or*

settlements related to flood levels"

(P2 Appendix 4, 4.1, 6)

P4 mentioned international experiences to explain the importance of risk awareness. She referred to the 2011 Japanese earthquake and tsunami which devastated the north-eastern coast of the country. She recounted that in that area, there was a place that the name translated is 'this is as far the tsunami has come' and therefore local people sought refuge there during the big wave event. This cultural flood parallel highlights the importance of preserving memory, associated with places or elements of the landscape, as a way to mitigate the risk. Arguably, this broad awareness informs the local flood culture in which other flood experiences converge to enrich the flood narrative of a place.

6.2.3. Response after the flood

After understanding the perception of the risk and sense of preparedness of the participants, the conversation focused on the issues developed during the 2015 flood. The common problem was identified in a lack of efficient communication of the risk from both official institutions such as the Environment Agency (EA) and the City Council of York, the social media, and between the same community. Interestingly, P6 (male, member of YCT) suffered from the urban disconnection and transport communication caused by the flood which made him feel isolated physically and socially.

"There was a slightly chaotic communication. I tried to get in touch with my colleagues, one of them was away from York at that time. (….) I had the feeling to be cut off like York was like an island"

(P6, Appendix 4, 4.1, 10)

Clearly it emerged from the discussion that the telecommunication and urban infrastructures were severely affected and inadequately prepared for the flood event.

Indeed, P7 (male, CMA) pointed out that the BT Exchange building flooding, which caused the rupture of landline service, could be avoided if the main power control system and exchanges were not located in the basement. However, P4 noted that while there was a lack of communication during the flooding, in the aftermath the emergency services and rescuers were open to a dialogue with the community. In the long term, she affirmed that even among the same community the communication about the risk is increased, exchanging useful information and advice.

Nevertheless, the lack of a prompt communication of the risk was also related to the rapidity of the flood event which highlights the lack of institutional preparedness. This is reflected in the difficulties of P6, who was working in the York Army Museum, taking part in voluntary rescue operations. He discussed the contraposition between the sense of guilt and the impossibility to communicate or reach the flooded museum:

> *"So, when they (The York Army Museum staff) posted on Facebook the news that they had been flooded there was in me a bit of guilt consciousness 'should I go to help' but there wasn't any public transport, 4 and a half miles away."*
>
> *(P6, Appendix 4, 4.1, 10)*

This experience shows that institutions such as museums need to develop an emergency preparedness plan offering training to all the staff members. Interestingly, P7 (male, CMA) discussed the effect of the 2015 flood event on the Merchant Adventurers Hall, from its management perspective. Despite the flood warning received in the afternoon, he found it difficult to gather information and updates through social media and news channels. It was only after checking the EA website, he realised that the Foss Barrier was open. With this increased awareness of the risk for the medieval building, as a first response, he promptly moved the silver cabinet from the undercroft to the first floor, whereas he used sandbags to limit the

ingress of the water to the building. This last measure proved to be ineffective and did not prevent the ground floor damage. While the Merchant Adventurers Hall had suffered from a historic flood, as shown by the flood indicators conserved in the ground floor, P7 admitted that in the museum an emergency plan was not adopted. The experience shared by the group in relation to their response to the flood event shows an active engagement of building users to the flood emergency. For example, most participants used sandbags or other measures to mitigate the ingress of the water in the building or dynamically checked the information available online. It is interesting to note that there was a collective agreement about the late response of the government in terms of providing clear direction in the flooding aftermath.

6.2.4. Recovery process

The recovery process was discussed by the group from a building perspective, focussing on the Merchant Adventurers Hall flood experience and the terrace houses located in Huntington Road (Figs. 6.1 and 6.2). The conversation was later contextualised within a wider urban perspective, describing the case study of York in relation to the national socio and political flooding response and strategies. Regarding the Merchant Adventurers Hall flood experience, it is evident that the materials and construction techniques used in the building reflect the awareness of the risk of flooding. It was interesting to record the flood impact to the ancient fabric and the contemporary additions. As discussed in chapter 5, the building has significant examples of adaptation measures implemented throughout the centuries to cope with flooding by adopting different architectural solutions, such as raising the level of the floor in the undercroft. Indeed, according to P7, traditional historic materials such as bricks and timber were recovered from the flooding in a short period. He pointed out that the intervention post-1982, after the construction of the Foss barrier, caused the major problems because elements were not flood resistant.

> *"But around the end of the 1990's when we thought that we couldn't flood we put the silver cabinet in the undercroft and a sophisticated alarm system and pump in the basement. Concerning the medieval fabric,*

it performed well in a couple of weeks. We could have opened the museum after 6 weeks but the problem was that they put in 2009 the emergency lighting power unit on the ground floor without any flood protection".

(P7 Appendix 4, 4.1,13)

In fact, P7 said that the building additions in the 1990s did not consider the eventuality of flooding. Therefore, less awareness is manifested with wrong choices of design such as poor planning of the emergency lighting system or display of the vulnerable collection on the ground floor. In terms of response, P7 described the recovery process for many buildings as 'turgid and long'. The Huntington Road area was compared to a ghost town in the aftermath of the flood. The dislocation of the people for more than a year and the long recovery process provoked a sense of detachment from the place and isolation. P4 noted a lack of good and transparent communication between the community affected, the insurance and the builders:

"They said that the recovery process was too long (humidifier for months, no necessity to remove the whole plaster etc.) and they thought it was partly to do with the insurance and partly to do with the increase of the health and safety anxiety. There was a strong sentiment in my community that the flood shouldn't have happened if the maintenance and the renovation works were effective in the barrier. So, they felt quite angry about that. But they also felt puzzled about why it took almost one year to go back."

(P4, Appendix 4, 4.1,27)

It became clear that the community did not take part in an active way in the reconstruction process. Moreover, the general understanding of the insurance company is that they use a top-down approach, without favouring a resilient adaptation of the building, especially for residential building. Referring to the Huntington Road flood recovery process experience, P6 finds that there was an imposition on the decisions of the building renovation without a mutual agreement

and consultation.

> *"It's funny how the insurance people oblige you to do the work or they don't give you money. There is a big sense of authority over you."*
>
> *(P6, Appendix 4, 4.1,30)*

In contrast for the Merchant Adventurers Hall, due to its historic significance, the insurance company paid for resilient measures such as the relocation of the power unit and the waterproof emergency lights. Another factor which had an impact on the time of the recovery process was the difficulty to understand the user's role in terms of responsibilities and guidelines. Especially tenants such as shopkeepers encountered several problems receiving information about insurance and intervention measures from their landlords who were not available to respond because living remotely. The lack of a prompt response exacerbated the flood damage, highlighting the need to clarify the mutual responsibilities for repair of damage and the role of the insurance companies.

The participants noted that adaptive interventions after the flood depend on the location and risk exposure of the building. P1 argued that there is a lack of a formal response from governmental institutions regarding the adaptation process in terms of guidelines. According to P1 it is the user of the building who decides about which adaptation measure to adopt in their property, responding to their perception of the flood risk. For example, buildings along the Ouse such as in the King's Staith area, have been adapted over time to respond to the flood threat. Thus, the group agreed that there is an intimate relationship between resilient measures and risk awareness. Moreover, in order to be resilient, the intervention measures need to be designed for a long-term period, considering the fragility and vulnerability of infrastructure such as telecommunications.

Next the group discussed the government response after the flooding in York. While at the building level the adaptation decision is related to individual perception

of the risk, in terms of the urban management of the flood risk the EA proposed a five-year plan to protect the city of York. Following the 2015 flood, the Government committed £45 million in addition to the £17 million earmarked for the upgrade and improvement of the Foss Barrier Pumping Station in order to reduce the risk of flooding (EA 2019). The group's perception was that the government priority for provision of funding for mitigation measures to the city of York is strictly related to its 'iconic' values, in terms of historic and cultural significance. Moreover, from the discussion, the group pointed out that the governmental decision was dictated also by the media pressure which focussed the attention to selected areas of the city ignoring completely other areas of Yorkshire which suffered from major flood damage. Similarly, **P1** affirms that even in the 2007 Gloucestershire flood, all the resources were diverted towards Tewkesbury due to the emblematic picture of the local church surrounded by water, whereas the emergency in Hull in 2007 was overlooked until there was a fatality.

Figure 6.1: Flood impact on the Merchant Adventurers Hall @Stephen Upright

Figure 6.2: Rescue teams evacuate residents in the Huntington Road area of York (28 December 2015) @Jeff J Mitchell (Getty Images)

6.3. Reflecting on the meaning of resilience

During the post-it activity, participants were asked to provide their interpretation of the concept of resilience. We discussed the UN definition of resilience (2009) and then I invited them to reflect on their meaning based on their personal experiences. The resulting data shown in fig 6.3, provide insights into how we can understand, explain and assign the meaning of resilience that is comprised within local knowledge. This approach is in line with the UK based DEFRA (Department for Environment, Food and Rural Affairs, 2008) strategies and the Sendai Framework guidelines discussed in chapter 2. These policies stress the importance of including non-expert perspectives into the DRM discourse.

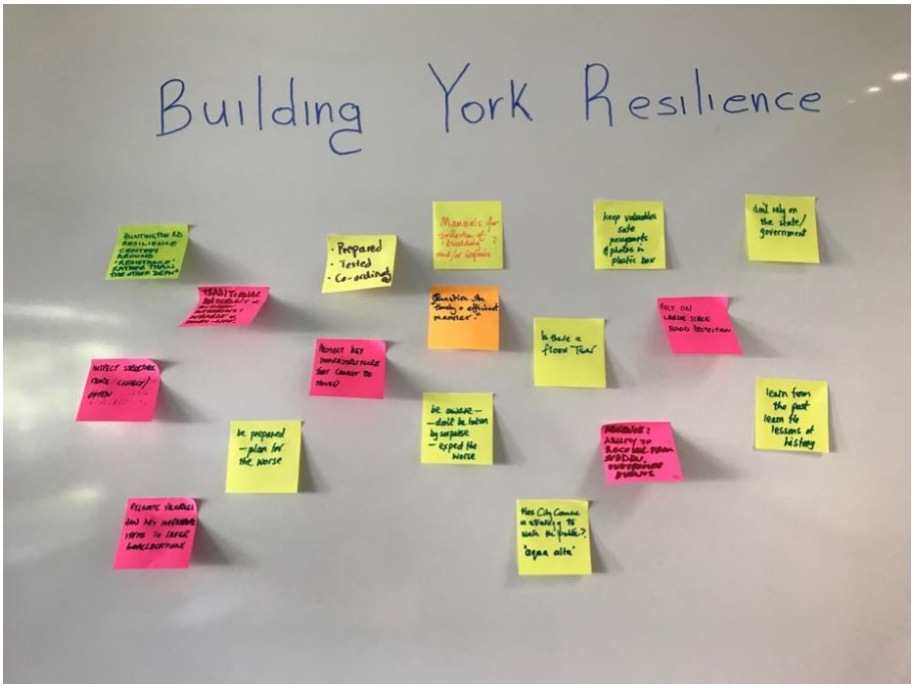


Figure 6.3: Post it activity in York. The meaning of resilience according to the participants @image by the author

The group engaged enthusiastically in this activity providing different definitions of their understanding of resilience. From the coding analysis of the different definitions provided (see Appendix 4, 4.2), it was possible to identify different themes connected to the meaning of resilience. Interestingly a contraposition emerged between structural and non-structural approaches to understanding resilience. This

reflects the dichotomy presented in the literature review (see chapter 2, 2.6) between engineering and ecological resilience. However, most of the definitions promote a community-centred interpretation of resilience based on dynamic adaptation through learning and communication.

In terms of non-structural definitions, it is evident that there is a strong correlation between resilience and **preparedness**. For example, the post-it suggestions on developing training activities and dissemination of knowledge through guidelines is a strategy that can enhance community resilience in the phase before the next flood. In addition, the role of disaster memory is considered by the group as crucial to enhance resilience. Indeed, one participant wrote “Learning from past experiences”, that clearly is another element that refers to the local flood culture and is closely related to the notion of resilience. Preparedness is conceived by the group from both individual and institutional levels. While urban flood infrastructures are considered necessary, the group also proposed simple measures for resilience that any individual can adopt such as "Keep valuables safe, passport and photo in a plastic box”. This proactive approach can be summed up in the post-it of another participant; “Don't rely on the state / government". This can be interpreted as empowering for the local community, who can actively participate in the mitigation process of the flood. From this data, the crucial role of **risk awareness** in relation to the concept of resilience is clear. The following two statements: “Is there a flood plan?” and “Be aware – don’t be taken by surprise”, can be interpreted as a need for raising the awareness of the population through preventative actions such as an ‘emergency plan’, and thus to foster transparent and accessible information about flood defence and impending flooding.

In the case of York, there is an interesting correlation between resilience and resistance. A small group of the participants’ definitions highlight a materialistic approach towards resilience as it relates to the notion of **resistance**. In terms of response to external risk, the participants defined resilience in relation to the capacity of the building to resist water damage, suggesting for example ‘Resilience

as resistance not absorption or accommodation' or 'Resistance rather than the other defence'. This understanding of resilience relies on the physical resistance to hazards from a flood engineering point of view. It became apparent that the two structural and non-structural approaches within DRM are present in resilience discourse in the context of York. As discussed in chapter 2, the contemporary understanding of resilience is related to its ability to evolve, change adaptively while resistance is the characteristic related to the engineering realm. However, the importance of a building to structurally perform during and after a flood event still represents a paramount issue for the participants.

6.4. Questionnaire for mapping York resilience

The analysis of the questionnaire responses was central to exploring the potential for collaborative mapping, discussed in chapter 4 (Kurniawan et al. 2017), and for gaining more detailed insight into local community engagement. In order to map resilience in the York case study, I created a questionnaire investigating the flood effects on historic buildings and users (See Appendix 2, 2.1 to consult the questionnaire pro forma). Twenty-two participants were asked to describe the phases before and after the flood event in terms of structural and behavioural mitigation measures. The closed questions allow a comparative analysis between the two phases (before and after), highlighting both the physical and behavioural flood mitigation methods adopted to protect the buildings. It is possible to compare how different building typologies and occupancy can influence the resilience of the building through the preservation and adaptation of traditional building construction. The final section of the questionnaire aims to investigate the perception of the respondents within the disaster cycle (before and after), focusing on the change in their risk awareness and preparedness for future flooding.

Another implicit outcome of the questionnaire is to promote active observation and participation of the users about specialist fields, such as architectural construction, reflecting on the difference between prevention and mitigation, and

different recovery approaches -serving to raise awareness of the natural risk of flooding to the historic environment. As indicated below, the data are analysed through GIS software to provide a visual representation and elaborate different thematic maps which show the results of the questionnaire. In order to answer the main research question, the novel methodology proposed uses PGIS: gathering data using traditional methods such as interviews, questionnaires and focus groups and combining with spatial features in a map. The first phase of PGIS methodology (Fig. 6.4) started by reflecting the local knowledge of different stakeholders spatially onto a map, with data drawn principally from the questionnaires but also from the focus group, which, in the second phase, can be consulted and analysed online generating a new shared platform of information that will benefit the stakeholders or even a wider audience.

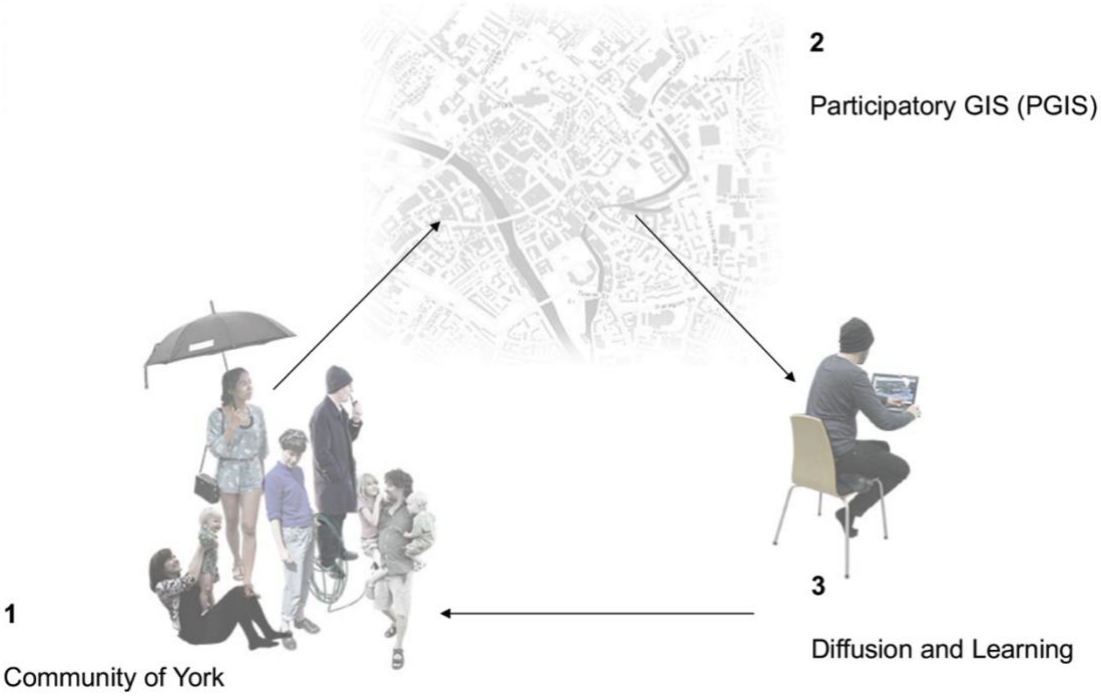


Figure 6.4: The three phases of the PGIS methodology. By engaging the community of York it is possible to create an interactive map using the GIS software and share the result with the same participants and with a broader community.

Once the GIS database is created, it is possible to perform a series of *queries* to the system to analyse the questionnaire responses in relation to the spatial location on the map. This creates different thematic maps of selected areas of the York city

centre that are exposed to flood risk. In the following two sections the analysis of the GIS maps is presented to show changing patterns in risk perception before and after the 2015 flood and the different reconstruction behaviours in the repair used to repair the buildings in the historic centre. The thematic maps illustrated below (Figs. 6.5 and 6.6) were elaborated to address the main research question, to visualise the intangible aspects of resilience. This includes the perceptions and practices that reflect the local flood culture of the York community. All the questionnaire answers are included in the additional data spreadsheet for York named "Mapping the resilience of York_Questionnaire responses".

6.4.1. The main causes of the 2015 flooding

In the questionnaire, before investigating the changing perception of the likely risk of future flooding, I asked the users of the building to describe the main causes of the 2015 flooding. As discussed in the literature review, understanding the causes of flooding influences people's perceptions of, and response to, risk. Thus, this information is significant to integrate the results represented in the maps. Concerning the causes of the 2015 flooding, all the respondents -especially along the Foss- mistakenly considered a failure of the Foss Barrier to be the major cause of the flood due to its lack of maintenance. The following statements recorded in the questionnaire show a major concern about the structural causes of flooding:

> *"The failure of the Foss Barrier allowed Ouse flood water to come back up the Foss." (R1)*

> *"The Yorkshire Water drainage did not work properly; it wasn't strong enough" (R4)*

However, as explained in chapter 5, the EA deliberately chose to open the Foss Barrier to minimise further flood damage. This general misconception about the real cause of the flood shows a lack of communication from national and local authorities with the citizens. Interestingly, as reported below, a small group of participants refer

to wider and complex causes that go beyond structural inadequacy, such as poor management and communication from the EA:

> *"Large amount of rainfall in a short period of time. Pumps were not adequate for the amount of water they were removing. Lack of clear communication/decision making." (R5)*

> *"Failure of the Environment Agency to maintain the River Foss Flood Barrier" (R6)*

In addition, one participant R18 indicates their belief that climate change was the cause of the frequency of flood events, which suggests a knowledge of other environmental issues.

6.4.2. Analysis of the 'perception of risk' map

The first two thematic maps are developed from the analysis of the questionnaire responses concerning risk perception: in other words, the subjective judgements of the respondents that can influence conservation practices and maintenance of buildings. The majority of the buildings analysed are located in the Fossgate/Walmgate area, thus the thematic maps are related to the properties along the river Foss. However, four out five respondents who are located along the river Ouse are certain that their building will be flooded again, showing a great awareness of risk. Indeed, the current comments of the participants were that the Ouse area floods frequently and the location of the building is in a high flood risk zone. As illustrated in figure 6.5, the community along the River Foss perceived risk differently before and after the 2015 flood. It is noticeable that while some building's users along Fossgate are becoming more aware of the flood risk, in the Walmgate area most respondents do not expect another flood. This is because they rely on the structural improvements made to both urban infrastructure such as the Foss Barrier and to their building after the 2015 flood. However, reliance solely on technological solutions proved ineffective during the flood of 2015 and led to the adoption of

solutions which include adopting different more resilient behaviours in terms of communication and preparedness. R1 (female, tenant) comments on a future risk scenario and what is likely to happen, highlighting the issue of communication and responsiveness of the building owners:

> *"I think we will know what to expect - how long it takes to dry out etc - and will therefore be very aware of what needs to happen. As tenants, we are not responsible for the upkeep of the building, but we can work more closely with the owners to put preventative measures in place."*
>
> *(R1)*

This poses interesting questions around the relationship between tenants, building owners and building conservation and maintenance. In her contribution, R1 advocates for a better dialogue around flood risk between the tenants and the landlord which could certainly increase the resilience of the building. Indeed, R1 as a tenant feels powerless and limited to make any decisions regarding the measures taken following the flood.

The two maps below depict the changing of perception of the risk (before and after the 2015 flood) in the Fossgate and Walmagate area. The first map clearly shows that the users of the buildings considered it unlikely they would experience a flood in that area because they have never been affected by such an event before, or they just were not informed that it was a flood area as R6 states: "Never gave it a thought prior to occupying the building in 2015." This is because the Foss Barrier has protected the area from flooding since its installation in the '90s as confirmed by the comment of R1:

> *"The Foss Barrier prevented flooding when the Ouse flooded. I assumed it would continue in this fashion. However, being so close to a river, there is always a flood risk."*
>
> *(R1)*

Similarly, the manager of the Merchant Adventurers' Hall R5 (female, building manager) thought that their building could perform efficiently as she did not expect a severe flood event such as the 2015 flood. She claims that:

> *"The Hall had flooded in 1982 after which a flood barrier was installed on the Foss which had prevented further flooding of the Hall. This had remained effective, keeping the Hall dry - even during the flooding of 2000 (the highest recorded flood level on the River Ouse)"*
>
> *(R5)*

The perception of the risk in the second map reflects the reliance of the respondents towards the new works for upgrading the Foss Barrier and their own buildings. Some respondents comment that it is fairly unlike that they are going to experience another flood in the future "Assuming that they have repaired the barrier" (R3) and "Because we upgrade the building" (R18). However, other responses show a major awareness of the flood risk as stated in the following comments:

> *"It depends on the timescale, but the Foss Barrier will fail again as precipitation becomes more severe and fewer measures are put in place further upstream to mitigate flooding downstream."*
>
> *(R1)*

> *"This area of York has traditionally suffered minor flooding for many years. it is likely to happen again, but hopefully not to the extent of the 2015 floods."*
>
> *(R6)*

Therefore, the overall analysis of the thematic maps suggests that along the river Foss despite the extensive damage provoked by the 2015 flood, the population has a low risk awareness as it still greatly relies on the Foss Barrier protection.

Figure 6.5: Perception of the risk before and after the 2015 flood. The river Foss community still rely on flood measures and barriers against future flood. @image by the author

6.4.3. Analysis of the 'repair approach' map

The second thematic map elaborated using GIS software aims to show the different repair approaches adopted after the 2015 flood (Fig. 6.6). The data for this analysis integrates the questionnaire responses with the information gathered from planning applications consulted online at the City of York Council website through the map search. This constitutes another set of data for some significant historic buildings such as the Guildhall of York where it was not possible to contact the user of the building to answer the questionnaire. From the analysis of the data, I recorded and grouped the following recurrent repair strategy interventions adopted in the York historic centre:

- Minor intervention: Cleaning and drying out
- Intervention with modern materials: Replacement of the damaged traditional part of the building with modern construction system (e.g. timber floor with concrete)
- Like for Like interventions: Replacement of the damaged traditional part of the building with new construction system to match with the original
- Resilient interventions: Replacement of the damaged traditional part of the building with a flood resilient construction system solution sensitive to the historical context.

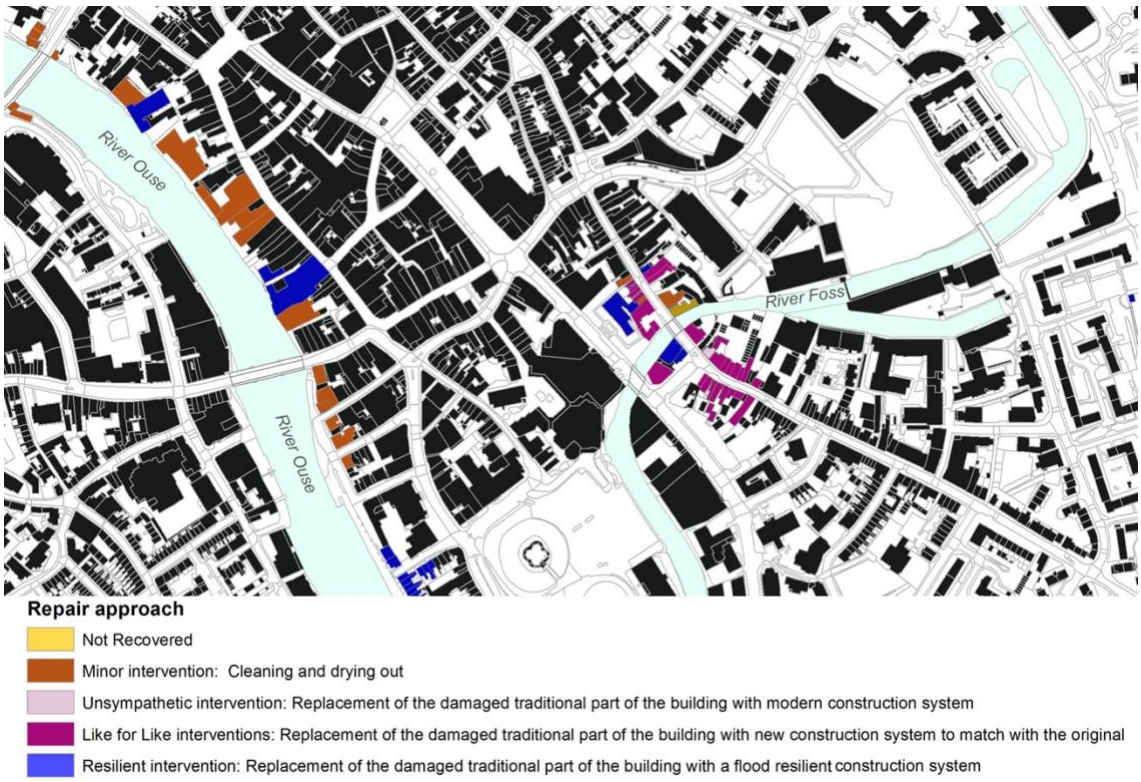


Figure 6.6: Repair approaches in York. This map shows the different repair approaches adopted along the two main rivers. It is interesting to note that along the Ouse, minor interventions and resilient measures have been used as the buildings experienced more flood events in the past. @image by the author

It is interesting to compare the results of the thematic maps along the River Ouse and Foss. Figure 6.7 provides evidence that the impact in terms of damage of the 2015 flood was more severe along the Foss. Indeed, the buildings along the Ouse, which historically are used to flood, needed just minor interventions of repairs. Indeed, some respondents who have had previous flood's experiences have proven to be more prepared in the 2015 response. R4 (male, building owner) argues that: "After the 2012 flood which badly affected the building, various flood measures were adopted". His building is located close to the river Ouse and he showed me the different systems put in place to avoid the ingress of the water through the building such as an external water pump and a flood gate. Therefore, after the 2015 flood he needed just paint and clean his building as it suffered minor damage.

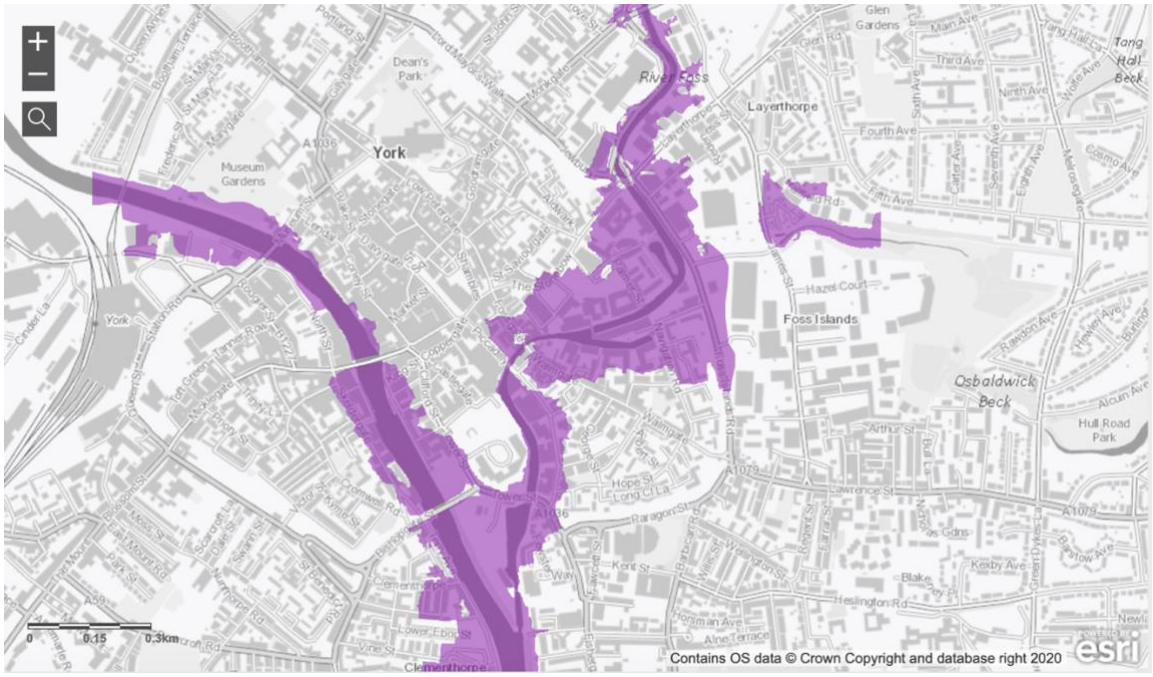


Figure 6.7: Incidence of the 2015 flood in the historic centre of York. It is possible to note the extensive damage along the River Foss. @image by the author

While the historic buildings along the Ouse needed minor repair interventions after the flooding, along the Foss, the 'like-for-like' repair approaches have been favoured without adapting the building to flood risk. This choice was strongly influenced by the support offered by the insurance companies that only financed works to restore the original state of the building. This is because the insurance companies do not consider the area of Fossgate at risk for future flooding as they rely on the Foss barrier flood protection. This is suggested by **R10** (male, Conservation Architect YCT), who conducted the repairs work as an architect for the buildings owned by the York Conservation Trust, located in the River Foss area, states:

> *"The interventions made in the buildings are not all flood resilient because it is very unlikely that there will be another flood event in the short term (due to the upgrading of the Foss barrier). The insurance company suggested to not adopt physical measures against flood as they don't consider this area at risk."*
>
> *(R10)*

This certainly raises new questions about the role of the insurance companies and their perception of risk in terms of financial support. Interestingly, the response of R3 (male, tenant, located near the river Foss) points out that resilient measures are not only related to the building but they influence behavioural patterns of the user such as prevention measures and learning experience:

> *"I feel more prepared through the 2015 flood experience; I am now registered on the EA flood line"*
>
> *(R3)*

This is a crucial observation which describes the multiple meanings of resilience in its tangible and intangible components. Indeed, most respondents adopted new behavioural measures, such as keeping valuable objects or electronic devices in the upper floors, as well adapting the architecture of the building in order to mitigate future damage. In terms of preparedness, which as discussed previously is closely connected to risk awareness, a significant group of building users feel, after the recovery process, more prepared to cope with the ingress of water into the building and therefore the perception of risk is low. This shows how resilient flood measures (i.e. raising electric sockets, using materials such as limelite that can dry out) can positively influence the user experience of living with risk. Indeed, while the respondents are aware of possible future flooding episodes, they trust that the resilient implementations will mitigate and prevent damage. For example, the owners of the Loch Fyne Restaurant & Bar on Fossgate, after ten months of repairs, used both like-for-like and resilient reconstruction solutions. They structurally reinforced the wall in the basement to prevent the ingress of water. However, the restaurant owner also wanted to redesign the layout of the electric fixtures (such as computer and sockets) and change the storage location of valuable objects to mitigate future flood impact. Another comment about the Merchant Adventurers' Hall from R5 (female, building manager) demonstrates that the medieval building has been adapted to live with risk:

> *"The Hall has been flooded on a number of occasions and being so close to the River Foss, further flooding although now rarer is likely to happen again. We are now far more resilient so should it happen again we will be in a better position to recover and recover quickly."*
>
> *(R5)*

These examples, recorded in the thematic map, show that the decision of which repair approach to adopt is closely connected to the location of the building and to the different perceptions of the probability of future floods. In the two sections that follow, two models have been developed for working with this data to explore the concept of resilience in an alternative way. Firstly, the interactive map is presented to explore the potentiality of PGIS to communicate risk and to enhance resilient practices. Secondly, an alternative assessment of resilience is proposed which looks at indicators and measures of resilience.

6.5. Interactive map of the York resilience

The concept of an interactive mapping of resilience, and an investigation of ways in which this can be implemented, is at the heart of this research. This section of the York case study describes and evaluates how the analysis of qualitative data, as discussed above, can be brought together with available technical data (heritage records and Environment Agency data) using ArcGIS online, to create an interactive map. This brings together the different urban layers and perspectives gathered in the research, that is both the tangible (material) and intangible (perceptions and behaviours) aspects of resilience. This is a crucial step to involve the community and support resilient practices and represent the novelty proposed in the research. The layers utilised from technical sources of data are obtained from the City of York Council, and are derived from the Conservation Area Appraisal of the city of York adopted by the Planning Committee in November 2011.

The layers from the City of York Council are as follows:

- **The age of the historic buildings** and their diverse architectural typology, material and style
- **Listed status** (I, II*, II)
- **Scheduled Ancient Monuments**
- **Buildings of merit**: This is a designation of the City of York Council included in the project City of York York's Historic Environment Record (HER) which holds information on the city's archaeological finds, historic buildings and monuments.

  In addition, the data provided by the by the EA are:

- **Flood defences** derived from the 2013 Strategic Flood Risk Assessment of the City of York Council

- **Historic floods record** source downloaded from york.gov.uk/dataset
  The layers show the maximum extent of all individual Recorded Flood Outlines from river, the sea and groundwater springs and shows areas of land that have previously been subject to flooding in England. Records began in 1946 when predecessor bodies to the Environment Agency started collecting detailed information about flooding incidents.

- **Climate Change outlines** (2020, 2050, 2080) source Environment Agency York Detailed Model 2016. The explanation of the climate change allowances can be found at https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

Overlaid on this data, the urban layers also have the intangible aspects which refer to human behaviour in this physical environment: building conditions, adaptation and conservation management of the assets affected by the flood, in terms of current

and past approaches adopted to cope with flooding. This information was gathered through a questionnaire and from other sources, as described in the section above. These intangible layers of local knowledge and experience are combined with the technical data to provide usable layers of information.

In the second phase of the elaboration of the maps, I systematized and adapted the data considering only that related to the historical centre of York, simplifying the recorded information to make them more accessible to the public. In fact, the data provided by the City of York and the EA included extensive information which was redundant for my research. For example, the EA historical flood data includes the entire national border, while I was interested in showing only the incidence of historical floods in the historic centre of York. Therefore, using the GIS software I performed several operations (i.e. *clip*) to select the geographical area in which I was interested and to relate these data to the historical centre of York. Similarly, the building age data derived from the 2011 York City Conservation Area assessment included detailed building dating. Therefore, to simplify the information I have grouped the historic buildings recorded into six main age categories (from medieval to 20th century). This has resulted in a unique database in which for the first time both information derived from the City of York Council and EA related to cultural heritage and flooding are contained. The process of selection and systematization of the data was crucial to developing the interactive map elaborated with ArcGIS online. This combines technical sources of data with the perception of the intangible sources of local stakeholders. The buildings recorded are digitised through 'shapefile' and connected to an Excel spreadsheet which contains the answers to the questionnaire. Or, as in the case of the flood defences, it is possible to link the map to external data like the Environment Agency website. A web-based method was preferred to support social learning and engagement, and to draw on the existing knowledge and capacities of the community.

6.5.1. 'Mapping York Resilience': Map interaction

This section aims to explain the map features highlighting the originality of the content and potentiality of this new tool in the conservation field. The accessibility of different data from the key organisations with the relative flood information is a significant aspect of increasing community resilience. The data collected from primary and secondary sources have been systematically organised and stored in the Esri cloud on-line database. I created an account using the University of York credentials. ArcGIS is not an open-source software; therefore, the support of the University was necessary for the creation of this project. The online map is created through ArcGIS online an Esri software that allows sharing GIS data and analysis without having installed the GIS software. It is therefore possible to consult the map from any device (smartphone, tablet and laptop) at the following link: https://arcg.is/1jXzCu0. This accessibility makes the platform ideal for public engagement. The pilot project "Mapping York Resilience" presents an interactive map that combines technical sources of data with intangible knowledge perception of local stakeholders and encourages the resilience discourse around the analysis of cultural built assets located in the area at risk of flooding. The main objective of this experimental map is to inform and involve York citizens and practitioners in action in creating a more resilient historic city to cope with the threat of flooding and to foster more transparent communication and sharing of information.

Figure 6.8 shows the main map interface of the York historic centre. The legend contains the information related to recorded flooding (from 1946 to 2015), the flood defences used, and the date of the buildings, highlighting the historic significance of the city centre. However, as shown in figure 6.9, it is possible to personalise the map by turning on and off the layers described above such as the listing denomination of the buildings and the climate change allowance. By clicking on those layers, there is an external link that will open the page relative to the source of the information (i.e. HER project, and EA flood risk assessment). This allows the users to deepen their knowledge about the flood risk and its impact on the historic

buildings of York. As discussed in the analysis of the questionnaire, there is a confused understanding among the citizens of York regarding the functioning of the Foss Barrier during the flood event of 2015. Thus, the information contained in the map aims to provide a clear and direct explanation of the institutional work on reducing the risk of flooding by improving the Foss Barrier design. Finally, the qualitative information gathered through the questionnaire is displayed in the pop-up window that appears by clicking on the recorded building. The example below (Fig. 6.10) illustrates the data relative to the Red Tower's questionnaire response. The descriptors used for each building recorded listed as followed:

- Use
- Age
- Listed Status
- Number of previous flood
- Physical measures
- Behavioural measures
- Damage occurred
- Duration of the recovery process
- Repair approach
- Perception of the risk before the 2015 flood
- Perception of the risk after the 2015 flood
- Preparedness after the 2015 flood

Moreover, a picture of the building is included at the bottom of the pop-up window. Often, these pictures were provided by the user of the building as in the case of the Red Tower. In addition, meta-data such as link to another webpage are included in the map as shown in figure 6.11. It became apparent that the map contains systematic information related to the flood response and impact on the selected historic building of York, integrating technical data with the qualitative data obtained via questionnaire responses.

Figure 6.8: The main interface of the map. The legend contains all the information that appears on the maps such as historic floods, the date of the historic buildings, flood defences etc. In the Details window, all the information about the app and the research are explained

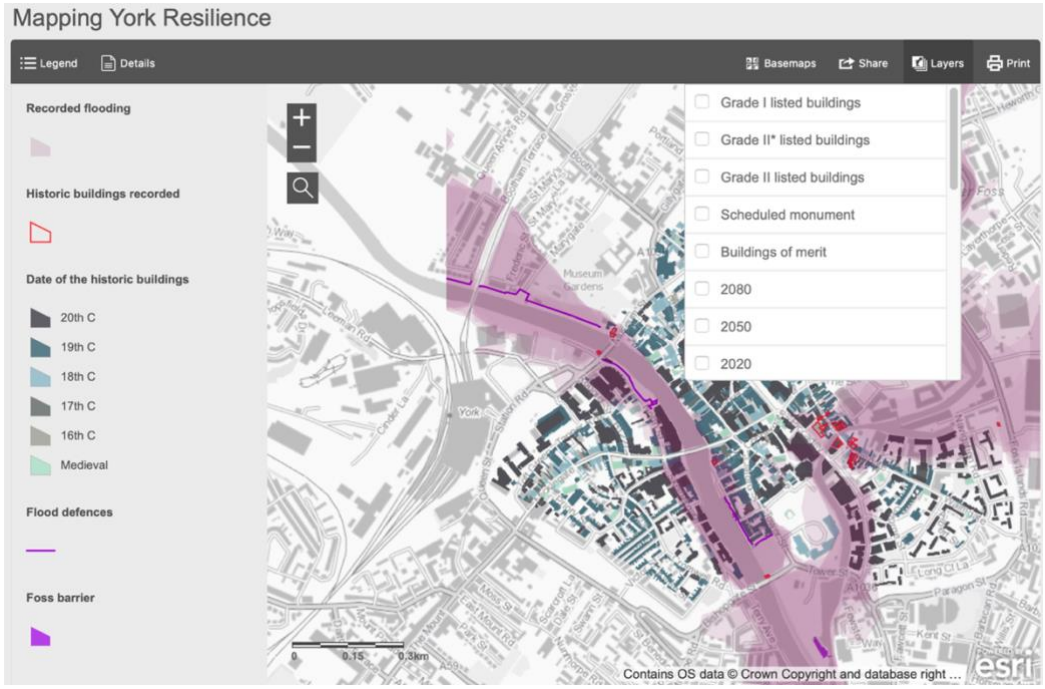


Figure 6.9 :Interactive map layers. The map can be personalised by turning on and off the layers of the map

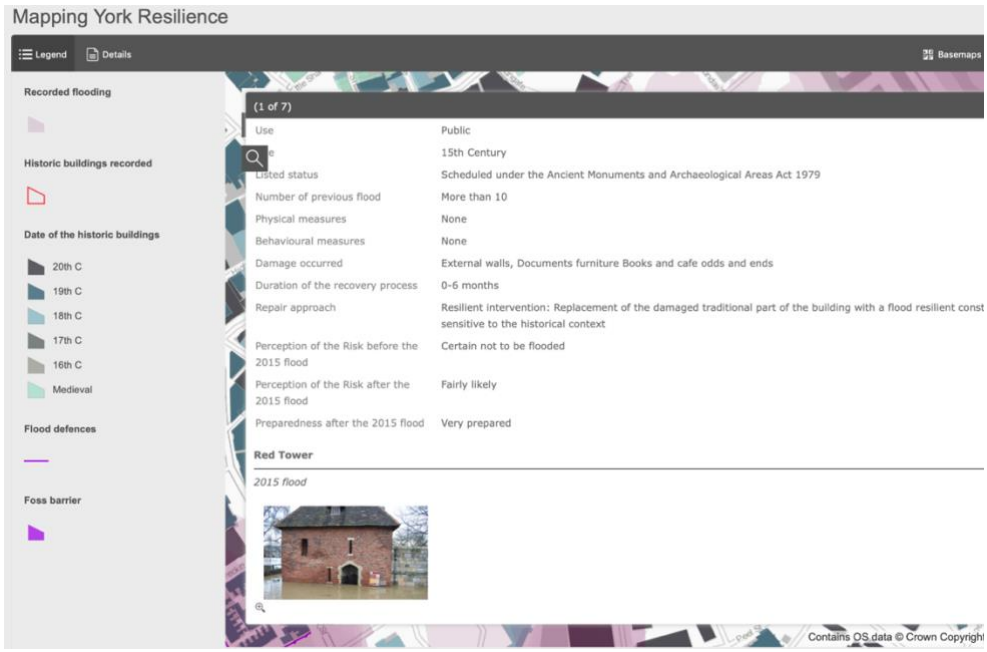


Figure 6.10: Interactive map functionality. By clicking on the historic buildings recorded you can read the answers to the questionnaire proposed to the York community after the 2015 flood

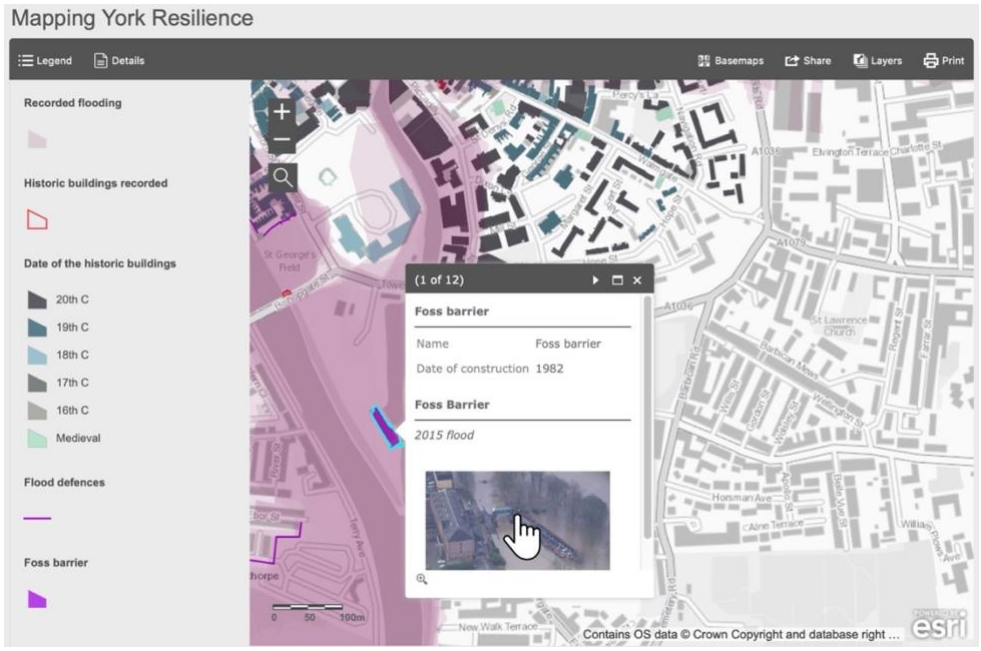


Figure 6.11: Interactive map functionality. When a hand-cursor appears on the pop up window picture you can click to explore the web linked information @images by the author

6.5.2. Feedback on the map

In order to evaluate the reception and usability of the map, interviews were conducted with relevant stakeholders in York. Namely, members of the City of York Council (CYC), Environment Agency (EA), York Civic Trust and York Conservation Trust. After a presentation of the project and an interactive activity with the map, the participants were asked to respond to the following questions:

Q1: Do you think the app is user friendly?

Q2: Do you think that there is a need for a shared platform of information like this app regarding the risk of flooding in York for historic buildings?

Q3: Would you suggest more information that could be added for the York community or/and specialists

Q4: Do you think maps are a useful tool to engage communities and enhance their resilience?

Q5: (Only for specialist) As a specialist, would you use this map to gather data to inform the decision-making process?

Participants enthusiastically engaged with the map and provided insights that suggest ways in which the app worked well, and also aspects that could be improved upon or added. The participant's responses (See Appendix 4, 4,5) have been classified into five themes based on the question topics:

1. Map design
2. Usability
3. Suggestion for implementations
4. Community engagement and resilience

5. Specialists use of the map

Map design and Usability:

Overall, the map is considered accessible, containing clear information about the historic and recent floods and the community response. The variety of information was particularly appreciated:

> *"It's very manageable the website here. It informs about prevention as well about resilience"*
>
> *(P6, male, York Civic Trust, Appendix 4, 4.5.1, 3)*

In terms of clarity of the information displayed, a member of the York Conservation Trust noted that the complexity of the different layers included in the map could be confusing if the whole historic centre was recorded. He states:

> *"It's really good at the moment where the buildings highlighted are just 20. I wonder if it was the whole historic centre, that could be a bit confusing. It's missing an extra zoom."*
>
> *(P10, male, York Conservation Trust, Appendix 4, 4.5.3, 2)*

However, he underlines the excellent quality of the information gathered, foreseeing the potentiality to use the map to inform the community about risk and preparedness. Interestingly, all the participants agreed that the creation of a shared platform which contains flood related information from different sources is a necessary step to enhance risk awareness among the citizens of York. For example, a member of the EA notes:

> *"I think that we certainly struggle, both ourselves and the city council, with getting the information out there and maintaining it. It's important to keep people aware in the long term and obviously, all these buildings can potentially change hands and it's important to remember*

> *what they've got and help them to remember how these things could be maintained. I think it would be really good for other buildings and think about what measures they used. It could be useful to create a forum between them all."*
>
> *(P12, female, EA, Appendix 4, 4.5.4, 2)*

This comment greatly validates the purpose and objectives of the development of interactive maps, highlighting the importance of keeping the community engaged and aware of the possibility of a flood event. Indeed, from the discussion with the EA, it emerged that as an organisation they struggle to keep the memory of the people concerning flood risk 'fresh'. That is why they found the data related to the perception of the risk before and after the flood interesting, suggesting that such information should be monitored over time. The York Civic Trust notes that with the map it is easy to compare different sources of information as they are uniformly digitised. Moreover, a York Conservation Trust member argues that the general population could benefit from this online map to increase the preparedness of their home.

Suggestion for implementations

Regarding the information contained in the map, some of the suggestions of stakeholders have already been incorporated in the presented online platform. For example, following the advice of the CYC and the EA, layers have been added on the listed status of historic buildings, and the one related to the future flooding scenario. Indeed, all the interviewees proposed interesting information that could be included in the map in future projects. The CYC, for example, suggested linking the building to the Council's Listed Building Consent (LBC) approved applications. In this way, it would be possible for the repairs and conservation strategies proposed to be adopted. In even more detail, the EA recommended including the specifications of the technical measures adopted in the buildings to inform resilient practices. During the interview with the York Civic Trust, different members suggest

also to include historic maps in the online platform.

Community engagement and resilience

Among the participants, the map has proven to be a valid tool to engage people and enhance practices and behaviour that foster resilience. The map has in fact been noted as an ideal instrument to visualise different forms of knowledge and information, such as the exposure to risk or forms of preparedness that are difficult to imagine otherwise. The CYC especially appreciated the combination of qualitative data with technical sources of information:

> *"I think it is interesting to see this qualitative information in a visual way. And you can see the story of flooding and that they are frequent. Could be a good engagement tool also for the historic environment as well to study the impact of flooding."*
>
> *(P8, female, CYC, Appendix 4, 4.5.2, 10)*

> *"You look at the EA website map and the flood zone is just a line with colour. With this you can look at the building with the qualitative information. I like the bit where people think about future flooding"*
>
> *(P9, male, CYC, Appendix 4, 4.5.2, 9)*

During the interaction with the map, members from the York Civic Trust found the visualisation of historic flooding that has affected the historic centre of York valuable. Especially to understand the relation with the construction of the urban flood defences. Another suggestion related to historic information included in the platform, layers from historic maps of York, in order to understand how the management of river water has changed.

Finally, the use of the map for cultural heritage and environmental specialists was a theme that emerged. The map includes information related to the York

community, about their response to flooding and some measures for resilience. The EA member supports the use of the map in their office. They highlight the potentiality of the map to visualise and quantify the resilience of York, which was one of the main objectives of my research question. The EA member recognises the lack of information available concerning resilient measures used in the historic buildings of York and she argues:

> *"I think (the map) it is valuable. I don't think anyone has got a full idea of how buildings are taking on resilience at all. We send the message that the city is open for resilience but we can quantify or know what it means? And (the map) it starts to give a picture about it.*
>
> *(P12, female, EA, Appendix 4, 4.5.4, 9)*

Thus, the map provides a 'picture' for organisations about how resilience practices are developing in the historic centre and where more technical or specialist input may be most effective, for example in guidelines and conservation strategies. Finally, the EA member underlines the importance of recording local information about the individual building and its user rather than only working with a large data set (i.e. environmental and urban data):

> *"I think it (the map) would be helpful because like I said a lot of stuff that we do as an organisation is working with our models and the models will say 'this would happen'. And your map puts it more in a local context and provides an understanding of what is meant locally. If we do modelling for the future, we can start to pick out locations and start to engage and talk with people and see what they have already got in place and see what they might need on top."*
>
> *(P12, female, EA, Appendix 4, 4.5.4, 11)*

The positive reception of the map, from both members of the community and

experts, illustrates the potential of participatory mapping as a way to understand and represent resilience. Moreover, the combination of different sources of information provides a holistic representation of the flooding response at the building level, contextualising the individual issues and recording the intangible heritage aspects.

6.6. An alternative resilient framework: York case study

This part of the research aims to contribute to the current debate on how to measure resilience (e.g. Mitchell 2013; Winderl 2014; Schipper and Langston 2015), focussing on built heritage that is exposed to natural hazards such as floods. In this section of the case study, an alternative approach is explored to assess and visualise the resilience of historic buildings affected by flooding in the historic centre of York. Gall (2013, 21) points out that due to the novelty of the resilience framework many scholars adapt approaches and methodologies developed in different fields, e.g. 'vulnerability studies'. Indeed, in the past decades, numerous frameworks and assessments have been developed to measure vulnerability, identifying hazards areas and the different degrees of risk exposure. Therefore, for this case study, the UCL PARNASSUS framework (described in chapter 2 see Stephenson and D'Ayala 2014) for assessing vulnerability has been adapted to devise an alternative method for assessing resilience in measurable, quantitative terms, that can be enhanced by qualitative data.

Given the relativity of the notion of resilience and the complexity of its theoretical assumptions (Bahadur et al. 2013), purely quantitative data (relative to the structural characteristics of the building, age, and typology) cannot capture the complex meaning of resilience. Therefore, the resilience assessment in this research is based on a mixed-method approach enhancing established quantitative methodology with the use of the qualitative data previously presented. This qualitative element uses data to measure resilience through a set of indicators derived from the review of literature (described in chapter 2). In order to test the researcher's hypothesis, the indicators have to meet the reliability and validity

criteria. An indicator is considered reliable when there is a consistency of the measurements over time whereas validity refers to how clearly the theory is supported in the chosen indicators (Bryman 2012, 164). The results of the measurements are verified and discussed with the local community and local organisations through face to face interviews and focus groups. Therefore, the methodology is conceived as a reflexive process which could be implemented through the participation of the local stakeholders who assess the validity and reliability of the research outcomes.

By adopting a mixed methods approach, it is possible to depict the multidimensional meaning of resilience, in terms of its tangible and intangible aspects, considering architectural elements as well as the local perception of risk. The data are managed and displayed using GIS software providing useful information for a visual analysis through maps. This could inform and assist organisations to prioritise conservation interventions. It is important to underline that the resilience assessment illustrated in the next section is tailored to the specific context of York. The importance is due to the subjective nature of resilience which responds to the local understanding and perception of risk.

6.6.1. Resilient assessment method

In this section, the approach to assessing resilience in York is described using a range of theory-based indicators selected for this research. The indicators are particularly relevant for examining my case study from a resilience perspective. They refer to the embedded characteristics of the building such as age; architectural construction and shape; condition and listed status. In addition to this I have selected a range of indicators that describe the resilience of the building; these are based on the data from the flood experience questionnaire that was gathered from the users of the buildings (See additional data spreadsheets “York_GIS vulnerability assessment”; “York_GIS resilient assessment”).

These indicators are related to factors such as recovery duration, risk perception and behavioural preparedness. The indicators adopted (Table 6.2) describe the resilience of a specific urban context. The first five are based on the study of vulnerability assessment proposed by PARNASSUS (chapter 2). The value-rating of the indicators that describe the vulnerability of a building are reinterpreted using the positive resilience approach suggested by the literature (Cutter 2008; Gall 2013). The measurable characteristics of the historic buildings already presented in the PARNASSUS project are:

- Age
- Construction
- Storeys
- Condition
- Listed Status

These descriptors are limited in their ability to fully express the concept of resilience. They lack a qualitative dimension which can be drawn from understanding the behaviour of the building users. Therefore, to fully measure resilience, I propose the following indicators:

- Recovery time of the building after the hazard event
- Previous flood experience of the building
- Perception of the risk of the user of the building
- Preparedness of the user of the building

Recovery time is a justified indicator due to the UNISDR (2009) definition of resilience, which includes: "(to) recover from the effects of a hazard in a timely and efficient manner". This can be adopted into my framework by looking specifically at the duration of the resulting conservation works. Moreover, the qualitative indicators namely previous flood experience, perception of the risk and the sense of preparedness related to the different stakeholders' responses provide additional

value to understand resilience. These criteria reflect the resilience of a historic building through the understanding of the user's flood experience and response. The adaptive capacity of a resilient system is described as the ability to learn from mistakes that shape the flood experience in terms of dealing with changes and capability of innovation (Tschakert and Dietrich 2010). Arguably, the resilient adaptation of the building is determined by the learning process and increase in risk awareness of the user. Therefore, based on the literature review of resilience discussed above, the rationale for the resilience ranking used in this study for each indicators' categories is:

- Older buildings with higher listing status are considered more resilient due to their level of protection and past flood experience
- Construction materials with less porosity and with upper storeys are less susceptible to the saturation caused by the water
- Pre-existing poor condition and lack of maintenance are factors that are considered to exacerbate the flood damage
- Short recovery time is a sign of high resilience (UNISDR 2009)
- Users of the building with previous flood experience and with a high awareness of the risk and preparedness are more likely to adopt resilience behaviour in terms of adaptation and coping with the risk.

Vulnerability assessment			
Indicators	**Descriptor**		**Vr**
Age	C 14th & 15th	Medieval/Tudor	100
	C 16th		
	C 17th	Jacobean	77,5
	C 18th	Georgian	55
	C 19th	Victorian	32,5
	C 20th	Modern	10
Construction	Shop window		100
	Timber frame with brick infill		70
	Brick Masonry		40
	Stone Masonry		10
Storeys	4		100
	3		70
	2		40
	1		10
Condition	Poor		100
	Good		55
	Excellent		10
Listed Status	Grade I		100
	Grade II*		70
	Grade II		40
	Not Listed		10

Table 6.1: Vulnerability assessment proposed by the PARNASSUS project included in Stephenson, V. and D'Ayala, D. (2014) 'A new approach to flood vulnerability assessment for historic buildings in England', Natural Hazards and Earth System Science, 14(5), pp. 1035–1048

Resilient assessment			
Indicators	**Descriptor**		**Rr**
Age	C 14th & 15th	Medieval/Tudor	100
	C 16th		
	C 17th	Jacobean	77,5
	C 18th	Georgian	55
	C 19th	Victorian	32,5
	C 20th	Modern	10
Construction	Shopwindow		10
	Timber frame with brick infill		40
	Brick Masonry		70
	Stone Masonry		100
Storeys	4		100
	3		70
	2		40
	1		10
Condition	Poor		10
	Good		55
	Excellent		100
Listed Status	Grade I		100
	Grade II*		70
	Grade II		40
	Not Listed		10
Recovery Time	0-6 months		100
	7-12 months		70
	13-18 months		40
	Still ongoing		10
Previous flood experience	Low		10
	Medium		55
	High		100
Perception of the risk	Low		10
	Medium		55
	High		100
Preparedness	Low		10
	Medium		55
	High		100

Table 6.2: Resilience assessment adopted for this study with the introduction of the new indicators that describe resilience. The Resilient Index resulted from the calculation of each resilience rating. ©image of the author

6.6.2. Pipeline of the resilience assessment

The first step for the resilience assessment was to collect primary data that recorded both measurable characteristic of the building (i.e. Age; Construction; Storeys; Condition; Listed Status) and the qualitative data related to the building user's response. The above tables (6.1 and 6.2) shows the indicators used in 17 buildings along the Fossgate and Walmgate area. The second step involves the assignment of 'resilience ratings' to allow a quantitative measurement of the overall resilience of the building. Each indicator has a corresponding Vulnerability rating (Vr) on a scale from 10 (low vulnerability) to 100 (high vulnerability). In the same way, for the resilience assessment, different descriptive parameters of historic buildings were defined and then associated with a Resilience Rating (Rr) on a scale from 10 (low resilience) to 100 (high resilience). The ranking is adapted by the work presented by Stephenson and D'Ayala (2014).

However, it is important to highlight that the rationale of ranking the resilience parameters in this study is different from the vulnerability assessment. This is due to the theoretical differences between the notion of vulnerability and resilience (Cutter 2008). While vulnerability focuses on the exposure to a risk and the potential damage, resilience is a positive characteristic of the system that emphasises the adaptation and learning process. For example, according to Stephenson and D'Ayala's study (2014), older buildings and those with higher listing status are considered more valuable and therefore present a higher vulnerability. Conversely, by adopting a resilience perspective it is apparent that older buildings have proven to be more resilient as they have withstood the passage of time and certain historic natural disasters such as a flood. In the same way, a higher listed status can be an indication that the building is owned by an organisation, governmental institution, or private individual that has more economic sustainability, better insurance cover and also expert advice for maintenance or conservation work. Thus, the Rr is deemed higher for both material fabric performance and economic resources.

Resilience ratings (Rr) were grouped into four classes of resilience (i.e. Low; Medium Low; Medium High; High). Once assigned the Rr, for each building it was possible to perform a statistical analysis with GIS combining the different indicators to provide the total Resilience index (Ri) (see Annex for the calculation in GIS). This value is obtained by adding together each resilience rating included in the selected indicator categories (see D'Ayala et al. 2016 for a guide to the derivation of the vulnerability ratings which has been adapted for the resilience assessment). The resulting Ri, displayed in a map following the resilience classification illustrated in table 6.3, allows a visual analysis of the different degrees of resilience. The graduated colour scale (yellow, magenta and blue) was adopted in contrast to the traditional green to red used for the vulnerability assessment (Table 6.3). Due to the limited number of buildings recorded, the data are representative only for the *medium-low* to *high* resilience classification. It is important to underline that no *low* resilience building was found corresponding to the classification, therefore in order to simplify the legend I indicated the group between 25-50% as *low*.

Resilience Classification	Statistical Grouping	Resilience Colour Classification
Low	0-25%	
Medium-Low to Medium	25-50%	
Medium to Medium-High	50-75%	
High	75-100%	

Table 6.3: Colour classification of the different degree of resilience determined by the Resilience Index @image by the author

6.6.3. Comparative analysis

In this section I will compare the results obtained through both assessments to explore their limitations and advantages. The resilience assessment proposed is applied to a group of historic buildings located along Fossgate and Walmgate that were severely affected by the 2015 flood. The choice of this case study enables a

test of the methodology in a significant area of the city centre exposed to flood risk. However, by following the systematic recording of the buildings described in the previous section, this method could be easily extended to the whole historic centre of York providing interesting opportunities for comparative analysis in different areas of the city. For the purpose of this research, I focused on 17 buildings which were recorded following the indicators described above. The aim of performing both a vulnerability and resilient assessment using GIS is to provide a visual representation of resilience through maps that could provide an alternative perspective in responding to flood risk.

The buildings chosen provide a representative selection in terms of age, typology, listed status and condition. However, in terms of construction technique recorded, the most common on the ground floor was brick masonry and shop front windows. This is due to the street's primarily commercial function. In terms of listed status, it is possible to document all four listing categories (I, II*, II and not listed). This indicator is significant to understand the different approach between vulnerability and resilience. Indeed, by comparing the resulting maps (Fig. 6.12) it is noteworthy that according to the vulnerability assessment the Grade I listed buildings are classified as the most vulnerable whereas the terraced houses (Grade II listed or not listed) have a low degree of vulnerability. In contrast, the resilience assessment shows that terraced houses and small properties are less resilient, because of their low listed status. In fact, through the questionnaire results and informal chats with the people affected by the flood in the Fossgate area, they argued that the insurance companies only allowed and financed 'like for like' reconstruction approaches. This is because the insurance companies rely on the new Foss barrier upgrading and they estimate a low risk for future flooding in the area. While for Grade I listed buildings, such as the Merchant Adventurers' Hall, it was possible to get more funding and expert advice from different bodies which allow resilience adaptation measures.

It became clear that the results in the case of the Merchant Adventurers' Hall

were highly significant. Following the vulnerability assessment, the medieval building can be considered highly vulnerable and therefore very exposed to the risk of flooding and damage. However, these results were contradicted in the analysis with the resilience indicators. The recovery time of the building after the 2015 flood was extremely short, less than six months. Indeed, the museum manager (R5 female) stated that they reopened to the public after only six weeks. Previous flood experiences and current perceptions of risk have shaped the awareness of the users of the medieval building. This has led them to adopt resilience measures to increase their preparedness. These results indicate that while the Merchant Adventurers' Hall is highly vulnerable, it is also in fact very resilient and prepared to cope with future floods. Thus, the resilience assessment provides an alternative narrative of the flood risk in a historic area using a positive paradigm highlighting that the resilience of the structure is related to both the material/design, and to the social systems that support it. Indeed, the indicators of resilience such as previous flood experience, perception of risk, and preparedness increase people's sensitivity to risk. This has a positive influence on their behaviour and adaptive capacity. Moreover, the resulting map allows for an effective and rapid visual analysis of the resilience of each building. This could support organisational decision-making processes in terms of prioritizing interventions or funding for recovery. The use of GIS and the creation of a database allows future updates and systematic monitoring at the urban scale. To conclude, it became apparent that a multiple criteria assessment that considers resilient aspects could better describe the complexity of a historic building in the area at risk. Moreover, this resilience assessment is a valid tool to assist in community preparedness and engagement.

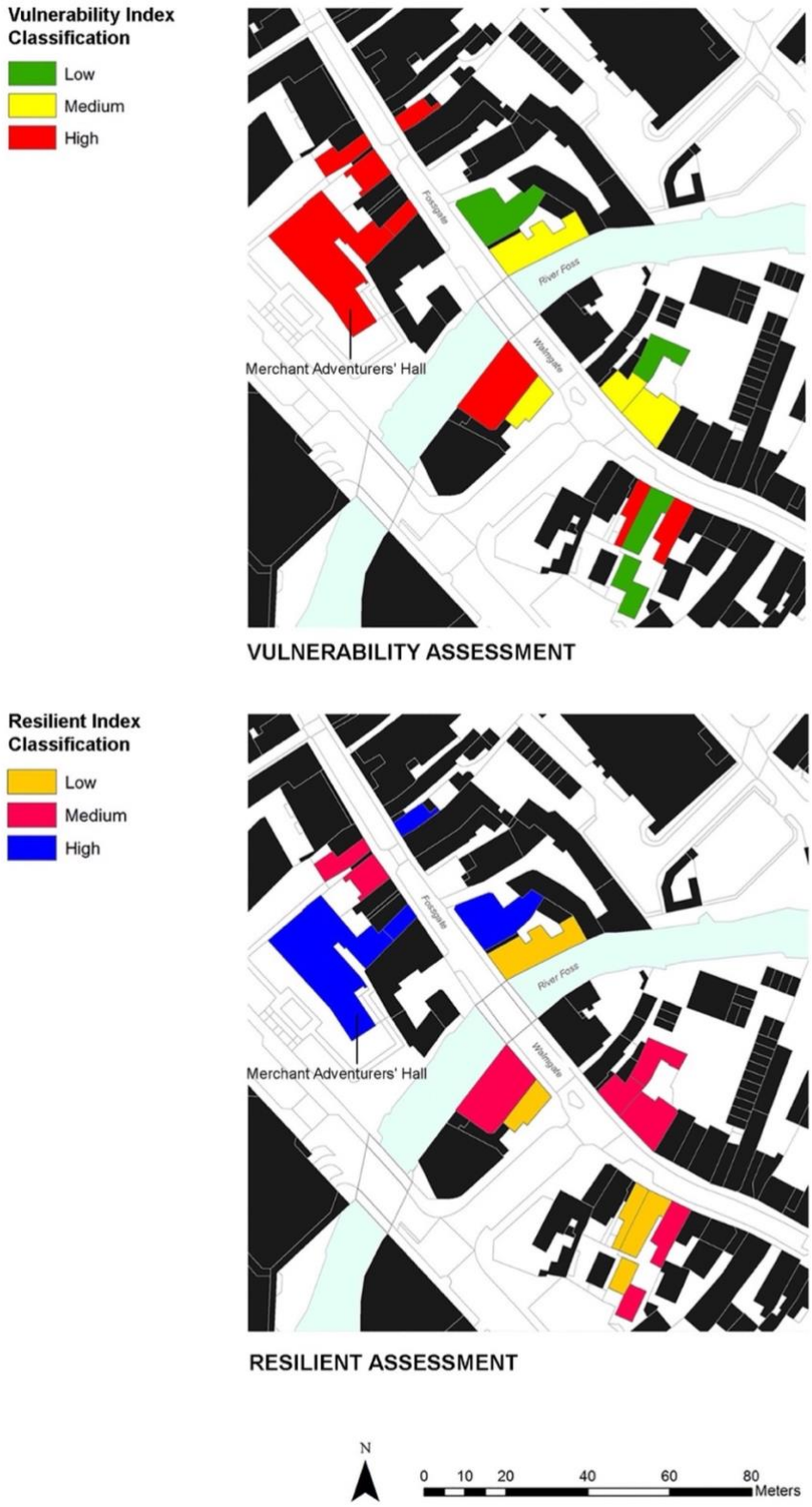


Figure 6.12: Resilience and Vulnerability assessment. GIS comparative analysis of the vulnerability and resilience assessment in the city of York @image by the author

6.7. Conclusion

According to Alexander (2013, 1273) resilience is a 'multi-faceted concept that is adaptable to various uses and contexts, but in different ways'. This chapter interrogated the notion of resilience in the specific context of the York city centre, providing a visual, qualitative and quantitative interpretation of the concept. The first section of the chapter presented the qualitative analysis of the data showing the different research methods used to investigate the meaning of resilience in the local context of York. Several themes emerged from the material presented, varying from the understanding, response and awareness of risk. As demonstrated, those elements greatly influence the recovery process of historic buildings. However, it was also demonstrated that the historic value of the city centre and media pressure have been significant elements that influenced governmental response. This is intended in terms of rapidity in emergency management and access to funding.

Regarding the understanding of resilience, the semantic contrast between resilience intended as adaptation or as resistance emerged among the participants in the focus group. The concept of resistance against flooding implies a need for structural flood measures (i.e. flood barriers) which disregard the adaptive characteristics of a resilient system. This creates a tension between the two different notions, resistance and resilience, showing that the technocratic and structural response to risk is predominant over the resilience discourse. This highlights the need for an integrated and holistic disaster management approach, combining structural as well non-structural measures to manage the risk, involving key stakeholders in all the different disaster cycle phases.

In the second section, the chapter presented the experimental use of collaborative mapping with the creation of an online GIS platform. This has proven to be an effective way to disseminate research findings and engage local stakeholders and inform local institutions. The creation of an interactive database in which different sources of knowledge regarding flood risk and response are

combined enhances the communication of a resilient approach in a democratic and accessible way. From the GIS analysis and the elaboration of the thematic maps, it became apparent that a building's location and exposure to the hazard influences the resilience practices used to mitigate the flood damage. Beyond the geographical context, it may be argued that the concept of resilience in the context of York is embedded in the physical and behavioural solutions adopted in the building. For this reason, the case study suggests that risk awareness and preparedness are the main factors that guide the application and enhancement of resilient practice. In addition, communication of risk with and between different stakeholders throughout the different phases of disasters (before, during and after) is clearly an essential component that empowers the local community and facilitates an effective response to the flooding.

The quantitative assessment of resilience is proposed in order to prove the limitations of the vulnerability framework of disasters. Drawing upon the UCL vulnerability assessment, the measurement of resilience through new indicators derived from the literature, provides a novel and holistic approach. Using the enhanced methods devised in this research the Merchant Adventurers' Hall case study demonstrates that the assessment of a building following only a vulnerability perspective can lead to a misleading interpretation of the actual condition and recovery of cultural heritage affected by flooding. A comprehensive approach which encourages stakeholder participation and consultation in decision-making processes is advocated for. This is in order to provide a contextual picture of the flood risk and perception. Finally, community participation and engagement throughout the data collection process is key to address the research question. That process highlighted the importance of the local flood culture in the city of York. This resonates with current conservation and DRM policies which encourage the inclusion of non-expert voices in the resilience discourse. The same emphasis on the role of community participation is presented in the following chapter.

7. Understanding the resilience of Amatrice historic centre

The concept of resilience as a 'bouncing-forward' characteristic of a system inevitably relates to the cultural traditions and values of a specific community. This is widely discussed in chapter 2, when applied to cultural heritage. Holtorf (2018) explores the links between resilience and cultural systems through the capacity of resilience to absorb change and continue to develop. He argues that the temporal continuity of a resilient cultural system is the product of a dialogue between the community and the legacy of the values of previous generations. Local traditions are seen as an active critical process of interacting with the past. They allow the system to progress while remaining connected to values that the community recognizes and identifies itself. The connective role between past and present through tradition and community's values, discussed in chapter 3, is central to this research's depiction of Amatrice's resilience.

Drawing on this premise, this chapter investigates a distinct way to understand and visualise resilience using participatory methods and GIS software. The structure of the chapter follows the same sequence as the York case study, thus facilitating a comparative analysis. In the first section, issues around risk management and resilience are discussed through a thematic coding analysis of the qualitative data. Then, the use of GIS is explored to represent intangible aspects of heritage such as community risk awareness and reconstruction ideas. Finally, the interactive map of the stakeholders' values relative to the historic centre of Amatrice is presented. In relation to the earlier discussion of value-based management of conservation (chapter 3), when the tangible expression of cultural heritage is suddenly affected

by an external hazard, the resulting change needs to be managed with respect for the values relevant to the community. Indeed, the map can be used to guide the reconstruction process respecting those values defined by the community as well as describing the complexity and multiple-meanings of the spaces that shaped the historic centre of Amatrice.

7.1 Summary of the workshop on Amatrice historic centre

The workshop was held in Amatrice on the 26 of July 2019 and explored stakeholder perceptions of the resilience of Amatrice historic centre that was severely damaged by the 2016 earthquake. The council of Amatrice provided a space for the activity in one of the S.A.E. (*Soluzioni abitative in emergenza* - Emergency Housing solutions) areas near to the historic centre (Appendix 7, 7.2, Figs. 31, 33 and 34). This activity was a fundamental step for my research, as described in more detail in section 4.5.4 of the methodology chapter. The workshop provides an alternative narrative of the values embedded in the historic centre of the city, focussing on its significance rather than the vulnerability and damage to its buildings. This approach aims to enhance the understanding of resilience after a seismic event using Amatrice as a case study. The workshop foregrounded issues around the management and possible reconstruction of Amatrice's cultural heritage. The participants highlighted the difficulties faced by the community in the aftermath of the seismic event, describing their relationship with the different institutions involved and sharing their personal experiences. The aim of the discussion was to enable an analysis of the different aspects of the local seismic culture of the Amatrice community; in terms of its capacity to respond, learn, and change after an earthquake. The approach proposed in this workshop reflects the experiences already described for the York case study, tailoring the questions and activities regarding resilience to the specific geographical context and its inhabitants.

Drawing on these issues, the workshop aimed to explore the relationship between the place, the citizens' heritage values, and the concept of resilience. The

intention was to generate debate around the local interpretation of these concepts. As is the case in a flooding scenario, understanding how the community perceives seismic risk and preparedness is critical in the reconstruction process of a historic urban centre in the aftermath of a seismic event. Through the lens of resilience, the workshop investigated the values associated with the built heritage of Amatrice, to inform conservation and reconstruction practices. As discussed extensively in chapter 5, Amatrice's physical context and much of its cultural heritage has been lost following post-seismic demolition and clearance (Carbonara 2018; Gizzi 2018), or severely damaged by the earthquake. Thus, in contrast with the case of York where the physical loss was minor, it becomes crucial to identify the values still related to Amatrice's cultural heritage through experimenting with participatory methods which engage the community. Despite the contextual differences of the two case studies presented, the methodological approach mirrors that which was used in York. Therefore, allowing a complementary framework of analysis for the discussion in chapter 8.

7.1.1 Objectives of the workshop

Using the method of participatory mapping with GIS software, members of the community were invited to 'virtually' assign values to the historic centre of Amatrice through their memories and their future expectations. The workshop fostered reflections on the importance of placing the community at the centre of the design and risk management process. Moreover, it informed participants about the resilience of historic buildings in the seismic area, highlighting their vulnerabilities and possible solutions for reconstruction. The objectives designed for the workshop were as follows:

- To discuss the main issues caused by the earthquake.
- To identify the important values attached to historic places in Amatrice.
- To record community perception of risk and preparedness.

- To define resilience and reflect on ways to incorporate it in the reconstruction process.

7.1.2 Participants

The workshop was well attended; there were 10 participants and the discussion was moderated by myself as a researcher. The activity proposed was advertised by the City Council of Amatrice (CCA) and the participants were self-selected according to their expression of interest in the workshop. The attendance at the workshop was not designed to be 'representative' of all the different local voices but welcomed a 'self-selected' group with special concerns about the future of the place and in some cases, good specialist knowledge. The group was varied in terms of representativeness and diversity. Regarding participants' professional background, there were four members of the City Council of Amatrice, one representative of the commerce association, an engineer specialising in structural design and four retired residents. The sample mainly included individuals from the age group of 50-70 except for two participants under 35. Eight males and two females participated in the activity.

All participants were residents of Amatrice or the nearby villages and had experience of the 2016 earthquake. Moreover, the group demonstrated a strong interest and engagement with the cultural heritage of the historic centre and were well informed about local history and traditions. Their diverse characters, individual knowledge and overall engagement contributed to an interesting discussion about the different topics of the workshop. Following the AHEC ethical guidance, at the beginning of the workshop, the participants were assured of their anonymity in the documentation. Though no names are included, the participants gave permission for their demographic and personal attributes to be shared in this study. This was necessary to understand the context of participant's contributions and responses.

7.1.3 Structure of the workshop:

The workshop was structured in four phases, lasting an overall duration of two hours. The first part of the workshop aimed to make the participants familiar with the topic and the research. At the beginning, through a PowerPoint presentation, I presented the theme of the workshop and the objective of my PhD research. Afterwards, the participants introduced themselves describing their personal experiences of the 2016 earthquake, highlighting the problems during the post-earthquake phase. This fostered a critical discussion on the issues faced after the seismic destruction, based on their personal experiences referring to elements of the local seismic culture such as risk awareness and preparedness.

The second part of the workshop involved reflection on the meaning of resilience. Similar to the York focus group, based on the United Nations definition of resilience (2009), participants were asked to define and discuss their views on what resilience means to them. This included a group exercise using post-its. The final part of the workshop explored a collaborative mapping technique as a tool to represent the values and resilience of Amatrice's historic centre. This part was tailored to collect local spatial knowledge from a small group of citizens interested in the promotion of the tangible and intangible cultural heritage of Amatrice. Due to the considerable number of participants, the group was split into 4 smaller groups and provided one map of the historic centre of Amatrice (scale 1:1000) each. For the mapping exercise participants were required to focus on the following analyses:

1. Urban analysis: This part of the workshop aimed to understand the embedded values of the urban settlement. The group defined significant areas of the historic centre pointing out their associated values. This activity was unstructured: as a researcher, I did not suggest the traditional values' categories (social, historical, aesthetic etc) but rather investigated what is special about the place to them.

2. Building analysis: In the second mapping exercise the group identified significant buildings within the areas previously analysed. They indicated on the map their values or memory connected to them.

Finally, in the last part of the workshop, there was an evaluation of the work and a presentation of the generated maps. Based on the themes that emerged throughout the different activities, the group shared their considerations about a future reconstruction for the historic centre of Amatrice.

7.2 Analysis of the participants' experiences after the 2016 earthquake.

This section presents the results of the discussion about participants' experience during the 2016 earthquake and its aftermath. The question addressed to the group aimed to provoke a discussion of the principal issues that occurred in the post-earthquake phase concerning their perception of resilience. Through their observations the complex dynamic between community, cultural heritage and national and local institutions is highlighted. Moreover, it is possible to trace elements of the local seismic culture of the city, (see chapter 2) and their influences on the community preparedness and risk awareness. The following analysis has been structured following the themes that emerged from the coding activity of the workshop transcription (see Annex 4, 4.6); causes of the earthquake, risk awareness and preparedness, disaster response and future reconstruction.

7.2.1 Understanding the causes of the earthquake

To be able to ensure local resilience, the vulnerabilities associated with the causes of the seismic event need to be understood and interpreted within the natural, social and built environment. Overall, among the participants, there was a general understanding of the exposure to seismic events derived from historic earthquake experiences in Amatrice and the proximate areas. The majority of the participants experienced previous earthquakes in the area and showed accurate knowledge about the geographic seismic risk. For example, the group explained that the

Apennines, where Amatrice is located, is one of the most seismic areas. It is indeed classified as seismic zone 1, which refers to the highest vulnerability. However, the 2009 earthquake which severely damaged the nearby city of L'Aquila had a minor impact in Amatrice. Due to the proximate location of the two cities, the 2009 seismic episode reduced the community's expectation that Amatrice would experience another earthquake within such a short time. Indeed, the assumption that the occurrence of severe earthquakes is spread over a long period of time decreased the awareness of the risk of the inhabitants of Amatrice.

The moderate damage in Amatrice after the 2009 earthquake already revealed an already inadequate construction of the buildings (see chapter 5). According to the participants, preventative mitigation measures had not been adopted in terms of building code application and reinforcement. It became apparent that over the years, the local seismic culture of the city has been gradually overlooked by the governmental bodies and within the local community, as reflected by the poor quality of construction materials and the structural inadequacy. As previously discussed in chapter 5, the lack of a solid local seismic culture in Amatrice is represented by the poor quality of the building materials and the gradual abandonment of good practices of traditional construction techniques. Indeed, the group agreed that the pre-disaster vulnerabilities of the buildings as well as a loss of local capacities and resources were one the main causes which exacerbated the earthquake damage in the historic centre of Amatrice. Nevertheless, other factors converged in the seismic damage such as the proximity to the epicentre, which was in the close village of Accumoli and the timing of the earthquake. The disastrous event struck during the night and in a holiday period, where the historic centre was densely populated. These circumstantial factors aggravated the impact of the earthquake in terms of casualty numbers.

7.2.2 Risk awareness and preparedness

As discussed in the previous section, while the participants were aware of the potential seismic risk of the area due to past earthquake experience, there was a

lack of risk preparedness in terms of structural response as well as strategic planning and behavioural measures. Initially, the discussion focused on the disaster emergency management by the local and national authorities and their relationship with the community and cultural heritage. One of the main themes that emerged from this first part of the workshop was related to the institutional response after the 2016 earthquake. The principal institutions involved in the historic centre management and recovery at the national level are the Government and the MiBACT of Rome (Ministry of Cultural Heritage and Activities). At the local level, this responsibility falls to smaller institutions such as the Amatrice City Council. Regardless of the size of the institution, every participant suggested that the approach adopted by all of them was 'top-down', thus excluding the community from the decision-making process and not considering their local knowledge. P1 (male, architect and member of the CCA) affirmed that the exclusion of the community leads to its fragmentation and internal conflict.

> *"Rispetto all'approccio post-sismico che c'è stato a me sembra che è stato principalmente 'verticistico' nella formazione delle prime decisioni. Non mi riferisco alla fase di emergenza, ma alla fase immediatamente successiva a mio avviso c'è stato un approccio 'verticistico' che ha escluso le tante sensibilità della popolazione. E questo ha creato un distacco fra quello che è il livello istituzionale e quello della popolazione e ha alimentato un distacco interno alla popolazione stessa. Aumento delle conflittualità." (P1, Appendix 4, 4.6, 1)*

> *"Considering the post-seismic approach it was mainly 'top-down' in the development of the first decisions. I am not referring to the emergency phase, but in the immediately following phase. In my opinion, there was a 'vertical' approach which excluded the many sensitivities of the population. This has created a gap between the institutional level and that of the population and has fed an internal detachment within the population itself, increasing conflict." (P1)*

Another aspect of the institutional response that highlighted a top-down approach was the disregarding of local knowledge and expertise during the disaster response phase. This was evident in terms of cultural heritage management during the recovery process. In particular, the workshop group referred to the emblematic case of the Church of St Agostino. After the 24th of August 2016 earthquake, the main historic buildings such as the medieval Church of St Agostino were only partially affected by the seismic impact. Sanfilippo and Romano (2018) affirm that the initial damage to the church related simply to the overturning of the upper section of the façade which corresponded to the 1933 reconstruction. However, the repeated seismic shocks in October 2016 and January 2017 led to the gradual collapse of the main and lateral elevation due to the lack of prompt interventions and safety consolidation of the church. The participants were concerned about the condition of the unique 13th Century frescos conserved in the church, which at the time of the workshop were not yet rescued (Fig. 7.1). The main critique of the group was towards the delayed response of the MiBACT, despite facing community pressure to promptly intervene. This increased the vulnerability of the affected buildings, further affecting the cultural heritage of Amatrice.

P2 (male, retired), an acknowledged expert of the cultural history of Amatrice, offered their help to the MiBACT to identify and rescue the numerous artefacts located in the more than 100 churches of the Amatrice area. He also was part of the *Comitato Civico 3e36* (see chapter 5), a group which aims to promote a participatory practice for the preservation of Amatrice's local culture. The ineffective institutional response forced P2 to act alone -where it was possible- to recover artefacts from accessible churches, in turn increasing their own personal risk of rescue intervention. Similarly, P3 (female, architect and member of the CCA), who before the earthquake worked for the local museum of Amatrice (Museo Civico Cola Filotesio) also found it difficult to communicate with the MiBACT and felt powerless in the situation:

"La mia sensazione è una sensazione di impotenza e frustrazione

perché non sei in grado di fare nulla, vorresti fare perché hai la conoscenza ma non hai l'opportunità di mettere in pratica quello che si conosce. Nel momento dell'emergenza bisognerebbe riunire le persone che hanno un minimo di esperienza per agire al meglio. In questo caso non è successo." (P3 Appendix 4, 4.6, 3)

"My feeling is of helplessness and frustration because you can't do anything; you want to do something because you have the knowledge but you don't have the opportunity to put into practice what you know. At the time of the emergency, it would be necessary to bring together people who have a minimum of experience to do their best. In this case, it did not happen." (P2)

This problem related to the perceived lack of transparency and communication concerning the recovery-status of museum objects. Interestingly, P3 introduced an issue of 'ownership' of the artefacts and the built cultural heritage. While the community of Amatrice collectively took care of these cultural objects before the earthquake, nurturing a sense of belonging, in the aftermath of the disaster they felt physically deprived of their cultural heritage and that their professional agency had been ignored. The top-down approaches and the 'paternalistic' attitude of the institutions, such as the MiBACT, were reported by all the participants as the major issues during the post-seismic phase. In particular, there was no consideration for the local specialists, who have been marginalised according to P10 (male, member of the CCA):

"Noi non siamo stati protagonisti né per le scelte dei beni culturali né per tutto il resto. Siamo andati in balia delle decisioni a livello nazionali e regionale che on hanno tenuto minimamente conto di noi. Probabilmente perché eravamo in numero esiguo che non abbiamo potuto opporre resistenza." (P10 Appendix 4, 4.6, 10)

> *"We have not been protagonists, neither for the choices of cultural assets nor for the rest. We have been at the mercy of national and regional decisions that have not taken any account of us. It's probably because we were in small numbers that we could not resist." (P10)*

Clearly, the language used to describe disaster management is emotional (such as *mercy* or *helplessness*) and reveals the sense of frustration resulting from exclusion in the reconstruction process. This finding suggests that there was an evident lack of communication between citizens and the main institutions which operate in the area. Even the management of the buildings rubble followed a top-down approach, raising question about ownership and citizen agency. R12 (male, owner) stated that during the process of demolition he felt excluded by the authorities' decision-making process, pointing out that he did not know where the debris of his property had been stored or managed. Moreover, the feeling of disempowerment in terms of removing the community from the decision-making process was combined with an increased sense of "estrangement" (Clemente *et al.* 2017) from the historic centre. Indeed, P4 (male, retired) and P5 (female, retired) describe that after the earthquake the community disintegrated as its members were relocated in different accommodation (such as S.A.E. or hotels). This top-down emergency management underlines the authoritative role of the state and the lack of public consultation. Also in terms of risk-preparedness, this approach greatly reduced the ability of the community to prevent further damage in the aftermath of the seismic event. It clearly demonstrates a lack of interest and willingness from the authorities to support a prevention culture.

Figure 7.1: Progression of the damage to the façade of Sant'Agostino after the earthquakes of August 24 and October 30, 2016. To note the lack of propping systems that caused further damage to the building (November 2016). @Antonio Ranesi

Figure 7.2: A pile of rubber and mattress debris (November 2018). Before being removed, the rubble is divided by material. @Enrico Fontolan

7.2.3 Response after the earthquake

Concerning the institutional response in terms of protection and safeguarding of the remaining cultural heritage of Amatrice, including tangible and intangible aspects, the group highlighted the delay in assuring the structural stability of the main historical buildings of the city centre. Moreover, the demolition of the historic centre and the removal of the rubble (Fig. 7.2) was another aspect that increased the sense of detachment of the community towards the historic centre. As previously discussed in the introduction in chapter 5, the initial demolition of the surviving buildings erased the urban pattern of the old historic centre. P8 (male, retired) strongly affirmed:

> *"Mi guardo intorno e vedo una distruzione. Il territorio che non era stato toccato dal sisma lo vedo completamente cementificato." (P8 Appendix 4, 4.6, 8)*

> *"I look around and see destruction. I see the territory that had not been touched by the earthquake completely cementified (covered by concrete)." (P8)*

Another theme that emerged from the coding analysis is the impact of social and mass media on the emergency response during the post-earthquake phase. According to the group, the main institutional bodies were pressured by media and political interests to provide a quick response to the disaster, leading to the adoption of short-term solutions. One example was provided by P5 (male, representative of the commerce association) who states that the creation of the two commercial areas namely "Il Corso" e "Il Triangolo" have caused a further fragmentation within the community:

> *"Ho notato fin da subito una grande impreparazione tra tutti i soggetti che dovevano tutelarci. Da subito dopo il terremoto, alla creazione*

dei centri commerciali che hanno causato uno scollamento della comunità. Non si è guardato al lungo periodo ma al breve, dando solo segnali mediatici. Diciamo è stato più un palcoscenico questo terremoto che una tragedia come è stato." (P5 Appendix 4, 4.6, 5)

"I immediately noticed a great lack of preparation among all the subjects who had to protect us. Immediately after the earthquake, the creation of the shopping centres caused a separation among the community. They [the governmental institutions] did not look at the long term [solutions] but at the short term, giving only importance to the media. Let's say this earthquake was presented as more of a theatre piece than the real tragedy it was." (P5)

The resentful comment of P5, which defines the earthquake management as a "theatre piece", outlines the divergence in response to the crisis by the local and national institutions. Here again, a top-down approach was adopted to provide temporary solutions that lacked consideration of community needs and local perspectives. Moreover, these 'quick and short-term solutions', judged by P8 as 'irresponsible interventions' have changed the territory, breaking with tradition and the past. P8 introduced to the discussion the exemplary case of the new school '*Romolo Capranica'*. The school was rebuilt in only two years following the earthquake, thanks to private donations and the voluntary labour of the Trento region. While the reconstruction was immediate, the architectural style and typology do not reflect the architectural identity of the area. Disillusionment, frustration, fear, incompetence and disappointment were the main feelings aroused among the participants by the discussion of these issues.

The language of some participants when describing the months following the earthquake positioned themselves as passive actors in the process. For example, the following are recurrent phrases: "We have been sent," "we received," "they built for us these little houses," "they gave us some tents." These expressions of a passive

role provide important insights into the role of the community that, in the case of Amatrice, has self-identified as a victim. A victim not only of the earthquake but of the processes of 'recovery' that followed on from it. However, some participants showed a positive attitude assuming a proactive role in the aftermath of the earthquake. P7 (male, architect and member of the City Council of Amatrice) stressed the importance of learning from history to increase awareness of risk and improve the management of territorial and social crises. Similarly, P9 (male, engineer) sees the earthquake as an opportunity to express the human potential to develop in a better way. In other words, to be resilient. Indeed, he recalls (P9 Appendix 4, 4.6, 9) events where new solidarity among the community emerged, often overcoming past personal issues.

The participants conveyed that local participative disaster response is key for the development of long term resilient solutions, establishing a constructive dialogue between different stakeholders and institutional bodies. As P5 (male, representative of the commerce association) pointed out:

> *"Il vuoto che ha lasciato il terremoto doveva essere riempito da qualcosa. Chi lo ha riempito a livello materiale, chi invece aumentando il proprio ego nel senso che ho notato la voglia di essere protagonisti a tutti i costi quando invece dovremmo essere tutti uniti e dovremmo essere più soldati che generali." (P5 Appendix 4, 4.6, 5)*

> *"The void left by the earthquake had to be filled with something. Some people have filled it materially, others by increasing their ego in the sense that I have noticed the desire to be protagonists no matter what, when instead we should all be united and we should be more soldiers than generals." (P5)*

The sense of 'emptiness' or 'void' was recurrently evoked by the group to articulate the different feelings aroused after the earthquake. The quote from P5 clearly

expresses that the emptiness left from disasters, if not managed by the institutions, allows a narrow and powerful group of people to take advantage of vulnerable situations. The sudden destruction of the material fabric and the resultant community displacement represent the two main factors that contributed to the deterioration of people's identification and emotional relationship with their physical space. On the other hand, the hierarchical response of the institutions was contrasted with the spontaneous activity of small groups of citizens who tried to fill the institutional void with campaigning and direct action to rescue the cultural heritage (see Comitato Civico 3e36).

7.2.4 Reconstruction

Reconstruction is the central activity of the post seismic phase which aims to reshape the physical and socio-economic environment as well as reinstating the connection between the community and its cultural heritage. From an architectural conservation perspective, the main question that emerged from the discussion was how to establish a connection between the architecture before and after the earthquake. This includes the reconstruction of the material culture of the urban settlement and its embedded values. The workshop took place three years after the earthquake in Amatrice. While the local authorities have started the reconstruction of certain surrounding areas, a plan for the reconstruction of the historic centre is still lacking. Among the participants there was a general feeling of frustration related to the long decision-making process. For example, P10 stated that the problem is about political corruption and management of the earthquake funding. He argued that because the dimensions of the historic centre are small, that this should have been managed much more quickly.

Concerning a proposal for future reconstruction, it was possible to identify two prevalent views. The first is to rebuild the historic centre *"com'era dov'era"*, adapting the buildings to meet safety standards, using anti-seismic construction techniques necessarily different from those of the past. According to some participants, the aspiration to remain faithful to the original design is more related to

architectural features such as colours and building volumes rather than replicating material factors, such as the traditional masonry and overall structure. For example, P2 suggested that rather than rebuilding with original structural technology, it is more important to respect the historic urban configuration and the traditional architectural features of the building façades such as the portals, roof details, stone and colour finishing. Amatrice was characterised by sandstone architectural elements and natural ochre tones of paintings and the traditional *palombelli* roof eaves. The integration of these elements into new architecture is considered paramount for conserving the cultural identity of the community. In favour of this is the contribution of P3 who affirms:

> *"Mi piacerebbe ricostruire nello stesso luogo, vorrei ritrovare quello che c'era, ritrovare la mia identità. Poi ci saranno sicuramente dei miglioramenti perché tu non puoi ricostruire com'era. Sarà un'altra cosa con le stesse forme. È un fatto emotivo, perché emotivamente ho bisogno di credere in questa cosa." (P3, Appendix 4, 4.8, 18)*

> *"I would like to reconstruct in the same place. I would like to find what was there, find my identity. Then there will certainly be improvements because you cannot rebuild what it was. It will be another thing with the same shapes. It's an emotional fact because emotionally I need to believe in this."(P3)*

The second opinion, albeit in the minority, is open to finding new stylistic solutions and a different location to reconstruct a new city. According to P8, the imitation of the past is symptomatic of a lack of creativity in contemporary society. He suggests the creation of a new model town, 'delocalised' in a safer territory arguing that "today's modern will be tomorrow's ancient". For the old historic centre, he envisaged its transformation into a touristic attraction such as a park, conserving the ruins and the old paths. This second proposal was energetically attacked by the rest of the group, who hope for prompt reconstruction. Interestingly, addressing the

reconstruction issue, P7 refers to other Italian post-seismic experiences such as Venzone (Friuli) and Gibbellina (Sicily) which represent these two different reconstruction approaches. This is another example of 'cultural disaster parallel' (see definition in section 6.2.2) related to seismic experiences which greatly influences community risk awareness and preparedness. As thoroughly discussed in chapter 5, the two different reconstruction approaches follow the slogan of *"com'era dov'era"* (how it was where it was) for the case of Venzone, and 'new town' for Gibellina. According to P7, the Sicilian experience has proven to be a failure from the community perspective, due to the lack of continuity with local traditions which were excluded during the long process of reconstruction. He stressed the importance of reconstructing the city in its old location, to allow the community to re-connect with its territory and cultural roots. Despite the contrasting opinions in terms of architectural style, the group cohesively shows their interest to rebuild the historic centre in the same location and to re-establish the connection between the material fabric and the traditions and intangible elements of the community.

7.3 Reflecting on the meaning of resilience

The third workshop activity involved the use of post-it notes to define the personal meanings of resilience within the group. As with the York focus group, I provided them with the United Nations' definition of resilience (2009) as a starting point for the discussion. From here, I asked the participants to define the word based on their own understanding (see Appendix 4, 4.7).

Figure 7.3: Post-it activity in Amatrice. Definition of resilience according to the participants @image by the author

The group initially showed indifference towards the theoretical concept and some participants struggled to write their definition. According to P2 (female, architect and member of the City Council of Amatrice), resilience was a new term that she only learnt after the earthquake, referring to it as a 'buzzword' without any relevant meaning. However, the group engaged with the activity providing various definitions of resilience drawn from their personal understanding (Fig. 7.3). From the coding analysis of the data it is interesting to note that for some participants, resilience was understood as a quality, e.g. tenacity or certainty, while for others it was perceived

as implicit in actions such as solutions or what can be done. For example, one participant wrote that 'Resilience is making new children', this comment perhaps reflects a desire to create a new generation of the community with familial connections to the territory of Amatrice. Indeed, one of the major consequences of the earthquake is community displacement and fragmentation. Thus, resilience is perceived to be connected to an attachment with the historic centre through younger generations and the nurturing of social relationships. The power of memory as a means for resilience was also discussed during this activity. The following statement: "Only the memory resists the earthquake" implies that memory can underpin a resilient reconstruction process based on the conservation of community traditions and values. Another interesting observation from a participant was that: "the resilience needs to be built and before the traumatic event arrives you do not realise that you are not resilient". This observation highlights the importance of supporting a culture of prevention throughout the disaster phases, nurturing a resilience approach. Interestingly, during this activity, the group proposed different practical solutions to enhance the resilience of the city centre in terms of training and preparedness of the community. For example, to increase the preparedness of the community in terms of response after the earthquake. P1 proposed a space for first aid located at the main gates/ access of the historic centre. From their experience, P1 noted that after the earthquake, whoever arrived first at the main street of Amatrice, realised that first aid was needed. In a historical centre with seismic risk, there is a need for a small shelter with objects for prompt intervention inside such as ladders, boots, picks, ropes (etc.) so those who come from outside who have not been impacted by the earthquake can use this equipment to offer immediate help.

Other contributions associated resilience with the "Reconstruction of the soul", "Involvement" and "long-term solutions". This theme is strongly connected to the need for a proactive approach and community inclusion in the decision-making process in the long-term, referring to both physical and spiritual reconstruction. This establishes a strong relationship between the tangible and intangible elements of the

historic centre of Amatrice. Moreover, some of the definitions express the concept of adaptability and change such as the participant's statement "Trust in change". As mentioned in the literature review, the concept of resilience assumes different meanings depending on the context and the theoretical field in which it is applied. The community of Amatrice found it difficult to relate their own experience to this notion. Interestingly, some definitions suggest that the concept of resilience is close to 'tenacity' and ' security'. This expresses the need for structural safety, enhancing both the response and recovery capacity after a seismic event. Indeed, some buildings suffered no structural damage during the earthquake, yet the government decision was to indiscriminately demolish them. Moreover, the lack of community participation in the decision-making process caused conflict and further detachment between themselves and the historic centre. Finally, it was clear that the absence of policies that foster community and building resilience contributed to the promotion of a top-down and technocratic approach.

7.4 Questionnaire for building Amatrice resilience

The promotion of resilient practices is closely connected with the understanding of risk perception and preparedness of individuals and communities. This informs the adoption of preventative measures combining structural as well as non-structural solutions in terms of future adaptation. The questionnaire was designed to evaluate the citizens' knowledge, perspectives and their response to the earthquake event and -in a similar manner to the York questionnaire- aimed to explore how the community perceived the risk before and after the 2016 earthquake (see Appendix 2, 2.2). Therefore, as discussed in the case of York, the potential of collaborative mapping is explored to allow the local community to share their perceptions and memories in relation to the damaged cultural heritage of Amatrice. As discussed in the methodology chapter, due to community displacement, the questionnaire was provided to shop owners that had been relocated by the municipality to the commercial area close to the historic centre. The set of questions follows the same structure as the questionnaire developed for the York case study. Despite the

different urban contexts and nature of the hazards, it was possible to identify common themes in both cases that allow a comparative analysis of the understanding of resilience (see Appendix 2, 2.2 to consult the questionnaire pro forma). The first section of the questionnaire asks for general information from the user of the building, in terms of type of occupancy and historic building information. It entails the description of the building characteristics such as type of property, function, date of construction, and structural typology. The second part explores risk awareness and preparedness before the 2016 earthquake, recording the participants' risk perception and anti-seismic architectural interventions present in the building such as buttresses, timber or steel ties, mortar grouting and concrete ring beams. The last section investigates the experience after the earthquake, describing the seismic damage to the building and its current condition and how risk perception has altered after the seismic event. Finally, participants were asked to imagine how, in a future scenario, they envisage a possible reconstruction and to explain which approach they would adopt for the historic centre.

Overall, 19 buildings were analysed to provide a similar range to the York case. In contrast with the case study of York, where the data of the historic buildings (such as age, typology) were provided by the City of York Council, in Amatrice, due to the lack of an official study, this information was collected exclusively from the questionnaire responses. However, it was possible to perform first a quantitative analysis of the responses to provide a contextual description of the qualitative data gathered. The following tables (7.1,7.2 and 7.3) display the result of the quantitative analysis. Although the age and the architectural typology were varied, most of the buildings (12) were built with stone masonry and reinforced with concrete elements such as ring beams and concrete floors. As already described in chapter 5, the historic centre suffered from an extensive demolition of the damaged buildings, considered at high risk of collapse. When I presented the questionnaire to the Amatrice respondents, only one building among those selected was still standing. This is because the owner carried out structural consolidation in 2002, which proved effective during the 2016 earthquake. The table 7.3 shows that 11 buildings suffered

severe damage and subsequent collapse whereas 7 buildings had minor damage but were subsequently demolished. In the following sections, the qualitative analysis of the responses is described using GIS software to develop thematic maps able to depict the community's **perception of risk** and the **desired reconstruction approaches** for the historic centre of Amatrice. The following maps and data reflect the local seismic culture of Amatrice in the aftermath of the 2016 earthquake. It is possible to consult all the responses to the questionnaire by consulting the additional data spreadsheet named: "Mapping the resilience of Amatrice_Questionnaire responses".

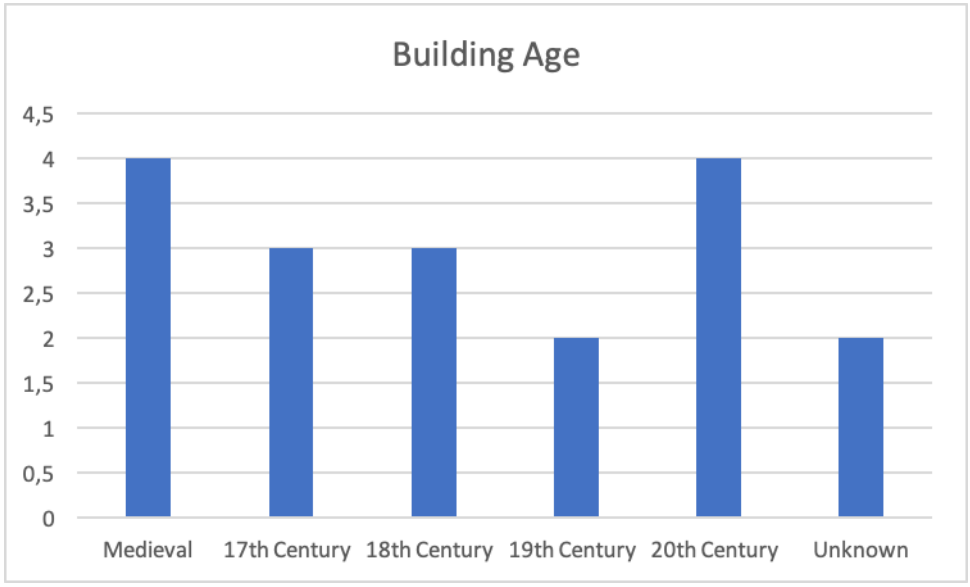


Table 7.1: Age of the buildings recorded in Amatrice as provided by the respondents to the questionnaire.

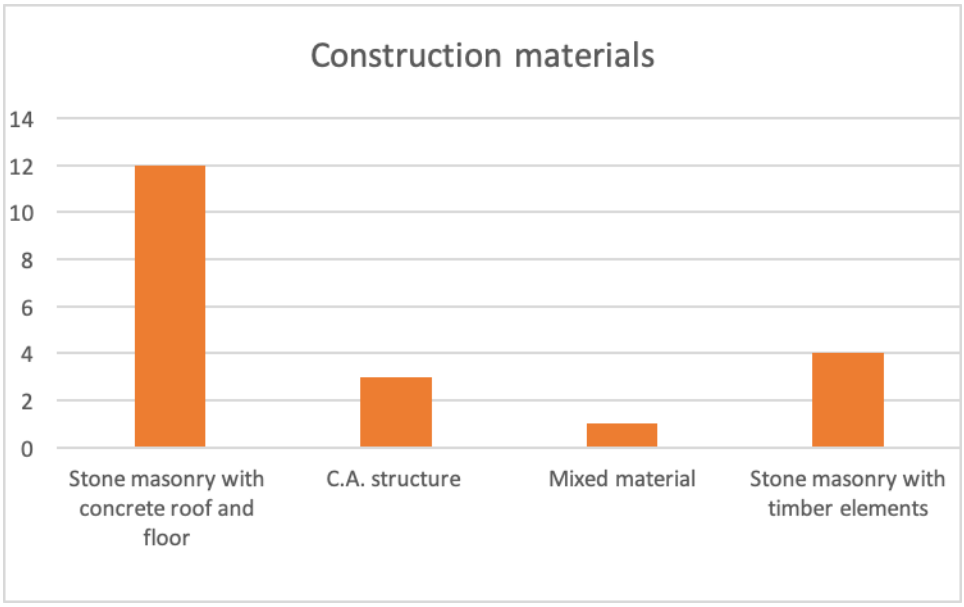


Table 7.2: Construction material analysis. Different construction materials recorded in the historic centre of Amatrice as provided by the respondents to the questionnaire.

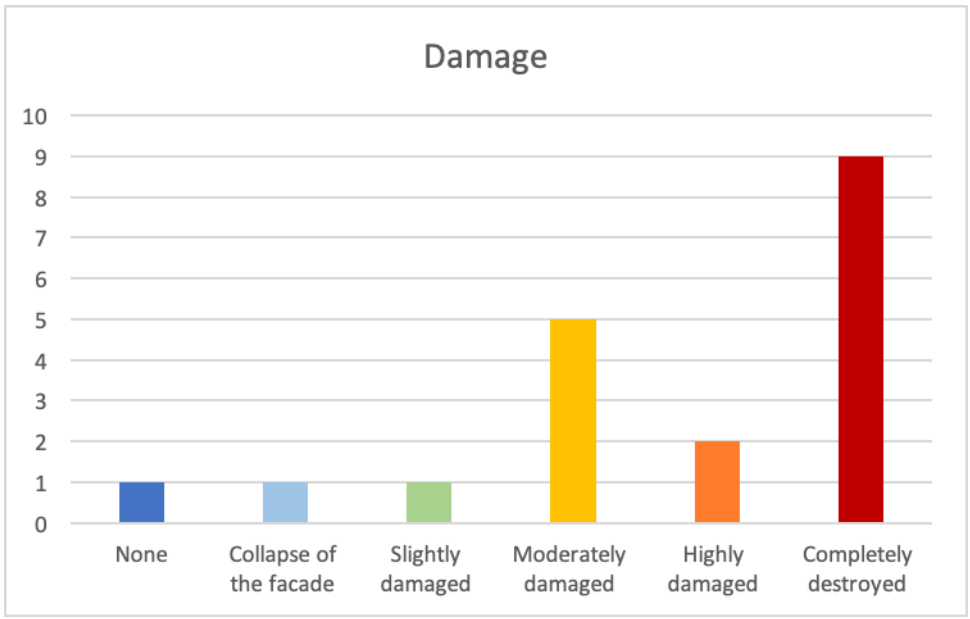


Table 7.3: Damage analysis. Damage incurred after the 2016 earthquake as provided by the respondents to the questionnaire. @images by the author

7.4.1 Analysis of the 'perception of risk' map

Overall, while the participants were aware of the historical seismicity of Amatrice their knowledge about the structural safety of their buildings in terms of anti-seismic design was limited. Except for one building, constructed in the 20th century, all the buildings analysed had been severely damaged by the earthquake and subsequently demolished. Furthermore, according to R5 (male, owner), there was a lack of community engagement after the seismic event. Similar to R12, R5 also felt excluded, powerless, poorly informed, and angrily he advocates for more community participation:

"Dobbiamo rimboccarci le maniche e participare di più"

"We need to roll up our sleeves and participate more".

The data gathered through the questionnaire constitute the database for the GIS analysis and are used for the development of different thematic maps which summarise the results of the investigation. The two maps (Fig. 7.4) show the changing risk perception before and after the 2016 earthquake. From the visual analysis of the map, it became apparent that before the earthquake the majority of the respondents considered the possibility of a disastrous seismic event as unlikely, and their building structurally safe. The perception of an emergent risk has evidently increased after the earthquake, unsurprisingly, as the participants have become more aware of their exposure to future seismic events. Interestingly, some participants highlighted the connection between risk awareness with the socio-cultural and governmental vulnerabilities. R7 (male, owner) affirms that: "Italy is fragile, rather than nature is mean". As well as the structural fragility, his comments focus on the inappropriate response and lack of preparedness of the main institutional bodies to provide a prompt response to the emergency and to meet seismic safety standards in the historic buildings.

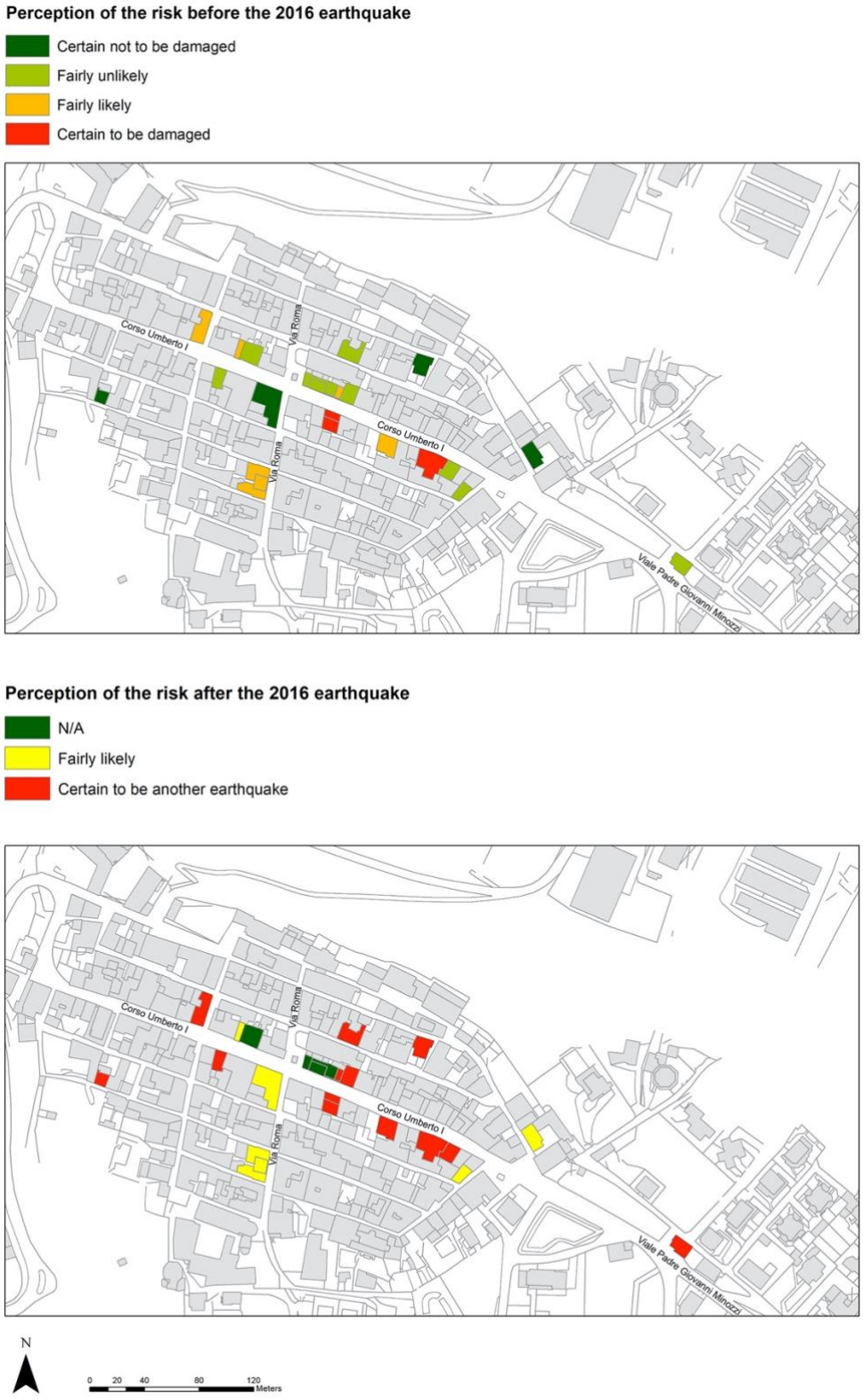


Figure 7.4: Perception of the risk Amatrice. GIS thematic maps analysing the perception before and after the 2016 earthquake. It became apparent that the perception of risk among the respondents has increased after the dramatic 2016 earthquake. @image by the author

7.4.2 Analysis of the 'reconstruction approaches' map

Regarding the future reconstruction scenario of the historic centre, the following basic options for participants were provided. These are simplified from historic and contemporary trends in reconstruction approaches, as identified in the chapter 5. The options were:

- **Reconstruct the building "*com'era dov'era*"** (how it was where it was) but adopting anti-seismic measures
- **Reconstruct the building with modern materials and technologies** without any attempt to replicate the original shape and appearance of the building
- **None**, I prefer to move elsewhere

From these results, represented in figure 7.5, it is evident that almost the same number of respondents opted for the reconstruction "*com'era dov'era*" as would prefer to move elsewhere. Whereas only a minority suggested an innovative reconstruction approach that follows the model of the new town. It is necessary to understand that in Italian the slogan "*com'era dov'era*" refers to reconstruction by adapting traditional building typology and construction techniques to the criteria of seismic safety. Indeed, the general comment was using an "anti-seismic structure but with the traditional finishing". Interestingly, **R7** (male, owner) observed that the reconstruction should be "authentic not identical". According to the respondent, the authenticity is not conceived as the identical physical reconstruction, but it should embed the same values and significance of the damaged heritage. This clarification between the two terms - authentic and identical - underlines the importance of undertaking a critical study of the traditional urban pattern and architectural elements, in order to conserve those features that are significant for community identity. For example, the urban configuration including streets and squares is deemed by **R3** (female, owner) of paramount importance for their social and historical values and she proposed just the reconstruction of the main street *il Corso* as it was. Similarly, **R11** (female, owner) argues that it is important not to alter the

historic urban pattern of the city. Another aspect of a reconstruction "*com'era dov'era*" was introduced by R9 (female, owner), suggesting a 'spontaneous' design, which can replicate the vernacular character of the historic urban centre. For example, she indicated that the roof-top line should be irregular, providing a vibrant experience for anyone walking through the centre.

The option to abandon the city centre and find another accommodation elsewhere, responds to the feeling of fear and unsafety connected with the earthquake experience. The location of Amatrice is considered dangerous due to ground conditions and the high seismicity. The majority of respondents affirmed that they prefer to live in the emergency accommodation (S.A.E.) rather than moving back to their original house. The small number of participants who opted for a new reconstruction with different materials provide the same motivation of prioritising a safe and rapid reconstruction. Some suggestions are: "I'd like to use timber and steel, the safety is more important than the appearance" and "I want my house safe and just with the ground floor". However, interestingly, most of the participants showed strong hesitation about the idea of a future reconstruction of the historical centre given the inevitably long waiting periods for proposing and finalising the designs of a new project for the city. This was especially true of older people who wistfully recognized their age during the questionnaire, feeling excluded from the reconstruction discussion. They found talking about the future in Amatrice difficult, considering the slow response of the main local and national institutions. Moreover, the general feeling regarding the reconstruction is that the community perspective and opinions have been overlooked.

Figure 7.5: Reconstruction approach Amatrice. GIS thematic map showing the suggested reconstruction approaches for the Amatrice historic centre. The 'authentic' reconstruction of the historic centre, following the motto "com'era dov'era" is the most popular response among the participants. @image by the author

7.5 Visualisation of the resilience of Amatrice

This section aims to illustrate the potential of collaborative mapping (activity n. 4) to visualise the resilience of the historic centre of Amatrice after the earthquake. This experimental method to represent and understand resilience, using qualitative analysis, is proposed as an alternative to the quantitative method described for the case study of York (see section 6.6). To accomplish this aim, spatial data of the centre of Amatrice were integrated with the perceptions and memories provided by participants of the workshop. Thus, the collaborative mapping exercise conducted in the Amatrice workshop shows how individual and collective memory are intertwined with the urban space represented in a map. It also explored the importance of the intangible dimensions of cultural heritage and its cohesive power within the community for its symbolic value.

> The symbolism inherent in heritage is also a powerful means to help victims recover from the psychological impact of disasters. In such situations, people search desperately for identity and self-esteem.
>
> (Manas 2013, 23)

Recording the values attached to buildings severely damaged or destroyed by an earthquake can contribute to the sense of belonging and identity of the community during the post-disaster phase as a means of building resilience. The outcomes of the collaborative mapping were digitised using GIS software and displayed through the ArcGIS online platform, so that the resulting map for Amatrice can be consulted online as a model of community mapping participation after a disaster event. It was also envisaged that access to the interactive map might improve the risk communication between different stakeholders and be used as a tool to understand the notion of resilience applied to the historic centre of Amatrice.

7.5.1 Previous mapping assessments in Amatrice

Before outlining the collaborative mapping method used in this study, I will provide a brief overview of previous mapping assessments in Amatrice performed after the 2016 earthquake. This will be useful to highlight and contrast the different approaches that were previously used, and underline the novelty of this research. To my knowledge, only three studies have used GIS maps to describe the impact of the seismic events in terms of damage to the historic centre. The Copernicus Project (2017) used satellite images of the historic centre to evaluate damage to the buildings as deduced mainly from the collapse of roofs. Another project, the GEER report (Fiorentino et al. 2018), provides a more accurate damage assessment as the data were gathered after a field survey of the town's main street (*Corso Umberto I*). The study combines the damage patterns of the buildings in the historic centre with their structural vulnerability to provide a more exhaustive interpretation of the causes of the damage. This assessment was performed for both masonry and reinforced concrete buildings. The damage classification was based on the European Macroseismic Intensity Scale EMS 98, which defines six damage levels, from D0 (no damage) to D5 (total collapse) (see Figs. 7.6 and 7.7). The results of Fiorentino et al.'s analysis show that the majority of masonry buildings present a poor construction system composed by "two panels of irregular stones connected by poor quality mortar joints, filled with poorly cemented rubble stones and without bondstones connecting the inner and outer panels" (Fiorentino et al. 2018, 1422). The lack of connection between the different elements constitute the main vulnerability that exacerbated the damage during the seismic event. While these studies are relevant to quantitatively explain the causes and mechanisms of the collapse of the historic buildings, they lack a more detailed description of the significance of those spaces in relation to the local community. Indeed, they focus only on the loss of the physical fabric of the buildings, using the vulnerability paradigm to depict the damage incurred. As I will illustrate in the following section, the purpose of collaborative mapping is to foster bottom-up community participation, presenting an innovative approach to record the tangible and intangible values of Amatrice's built heritage.

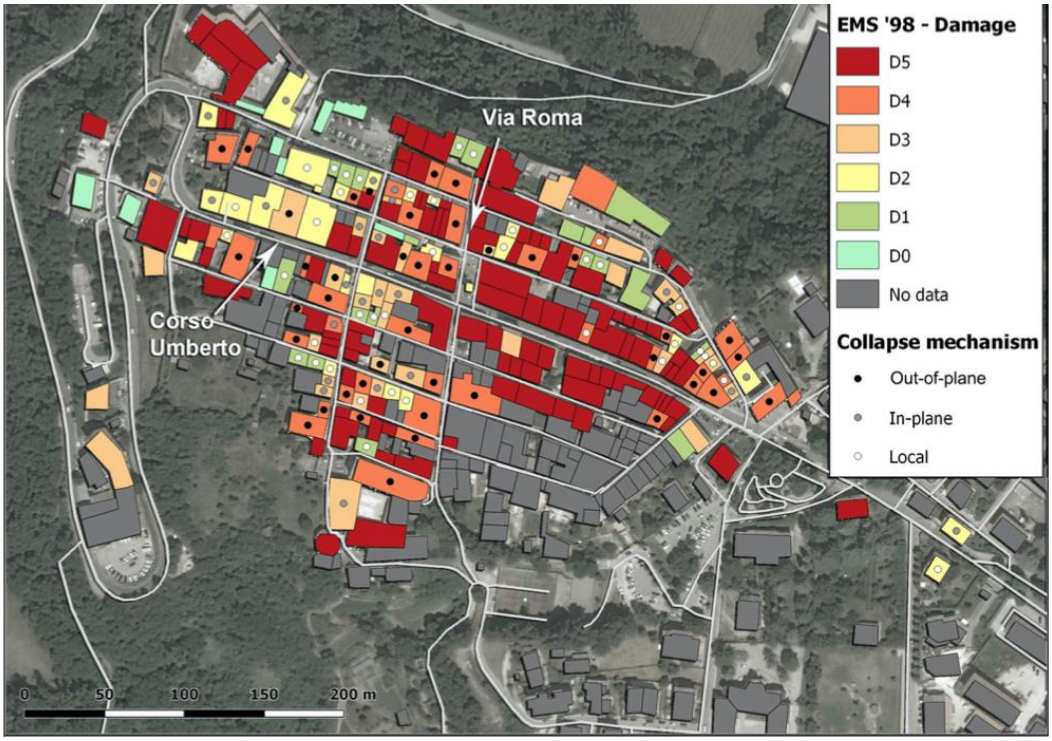


Figure 7.6: Map of damage in Amatrice according to EMS-98 damage classification (Fioretino et al. 2018)

Figure 7.7: Aerial view of Amatrice historic centre after the demolitions decided in response to the damage assessment (Google earth)

7.5.2 Analytical framework of the collaborative mapping

The main objective of the collaborative mapping activity was to establish the connection between people and places, through their own values that link to the historic centre of Amatrice. The understanding of the notion of place (Bodenhame, 2010), discussed in chapter 3, as the result of social interaction, cultural identity and emotional attachment, is fundamental to justify the mapping activity proposed in Amatrice. Cultural mapping and value-based methods empower stakeholders to ascribe meaning to places, visualising collective values and actively participating in conservation activities. According to Avrami, using spatial analysis is central for the resilience discourse as:

> These rich and diverse catalogues can raise awareness about intangible and tangible heritage and the links among them, and potentially underpin community identity and resilience through shared memories and narratives.
>
> (Avrami 2019, 36)

Therefore, the principal aim of the cultural mapping was to inform the broader range of values both tangible and intangible, by collecting personal memories and experiences. Alongside this, the recognition of the values of the historic centre, even if severely damaged by the earthquake, aimed to enhance the cultural identity of the community represented by the participants. Thus, the collaborative mapping in Amatrice considered the multiple layers of values represented in the spatial configuration of the historic city, asking the participants to frame the complex spatial, historic, spiritual and social relationship.

During the collaborative mapping activity, using their own memories and personal experiences, the participants identified intangible values attached to the physical places on scaled maps of the historic centre of Amatrice. This information is fundamental to guide the reconstruction of an urban settlement, in addition to the

conventional engineering response. The four maps generated during the workshop (see figures below) have been analysed and coded to find similarities and differences in local values as they relate to physical space. Then, through the analysis of the coding and recurrent themes it was possible to 'categorize' the indicated values. The principle categories described in the literature review (i.e. HE Conservation Principles) were compared with the values that emerged during the mapping activity. The socio-cultural values; namely historical, cultural symbolic, social, spiritual and aesthetic have been considered in order to elaborate the set of values for the Amatrice historic centre. The need for common categories has been clarified by Mason (2002) as a necessary methodological step to compare and evaluate different projects, as diverse values are interpreted subjectively. However, it is crucial to clarify that the resulting value framework is the result of a bottom-up activity and responds to local perspectives and understandings of the historic spaces.

Figure 7.8: Collaborative mapping activity. Some examples of the results of the workshop on collaborative mapping showing participants' values associated to the historic centre of Amatrice (see all maps in See Annex 7, 7.2, Fig 35) @images by the author

7.6 Mapping values of the Amatrice historic spaces

Once the coding activity was completed, it was possible to design the interactive map using GIS software by creating the thematic layers as defined by the group. The values identified from the coding analysis have been connected to the physical spaces of the urban centre such as squares, streets, religious buildings, shops etc., based on what participants recorded which could be connected to the intangible heritage of the historic centre including spiritual traditions and public festivity. The resulting map includes the following thematic layers which resulted from the general categories defined by the coding. The text has been translated in Italian to improve the accessibility and the understanding of the map contents for the Amatrice community.

ENGLISH	ITALIAN
• Spaces of History	• Luoghi Storici
• Spaces of Leisure	• Luoghi delle Attività Sociali
• Spaces of Tradition	• Luoghi delle Tradizioni
• Spaces of Beauty	• Luoghi della Bellezza
• Spaces of Culture and Education	• Luoghi della Cultura e dell'Istruzione
• Spaces of Play	• Luoghi per il Gioco

The notion of space reflects the close relationship between resilience and localism discussed in chapter 3. A space is shaped by the social interactions informing its significance and contributing to the local identity of a community. While these layers can be related to the broader literature of conservation values which underpin the modern concept of heritage, it is necessary to highlight that they have been identified by the local community using their own vocabulary and graphic representation. From a general perspective, the participants highlighted in the maps those buildings which had acknowledged historical and aesthetic values such as churches or the local museum, defined as **'Spaces of History'**. The group described those places as

connected with the collective identity of the community, expressing the desire to be able to experience them again even if ruined. Indeed, one participant pointed out on the map the damage of the earthquake to St. Agostino church; he highlighted the lack of response and intervention by the local and national authorities to rescue important cultural objects or historic frescos. However, participants also indicated places where they lived and that were part of their personal and individual experience such as weddings or childhood memories. To these places the group marked on the maps their emotions, such as pleasure or love, connected to a specific place, some used symbols such as a big heart (Fig. 7.9).

Public spaces, such as streets and squares, play a crucial role for the identification of the values of the historic centre. For example, one group defined the main street of Amatrice, *Corso Umberto I*, as 'the life'. It indicates that this area was the core of the community's social interaction and leisure. Indeed, along this street all the main leisure services, such as bars and shops, were located. P3 remembered that the main street, *il Corso,* positioned between the St. Agostino and St. Domenico church*,* was historically considered a social space like a square, where the main commercial and community exchanges took place:

> *"Prima dell'avvento dell'automobile, Amatrice mancava di spazi grandi o di piazze cosi il Corso si chiamava piazza. Era un luogo di socialità. Sant'Agostino era il capo-piazza, cioè dove cominciava la piazza".(P3, Appendix,4,4.8,15)*

> *"Before the advent of the car, Amatrice lacked large spaces or squares so the Corso was called a square. It was a place for socializing. Saint Agostino church was called 'capo-piazza', that is where the square began".*

Before the earthquake, this street played a crucial role within the community, especially during the summer when citizens walked along *il Corso*. A participant also

noted the saying *"fare le vasche",* which means walking repeatedly up and down the street, as this activity was closely connected with that place. The main social activities were held along the main and oldest streets of Amatrice, *il Corso* and *Via Roma,* where the most popular bars, restaurants and shops were located. These places are defined in the maps as **'Spaces of Leisure'**. Another important aspect that emerged from the workshop was the importance of documenting the vast intangible heritage in terms of traditions, festivals and religious processions which represent the historical traditions and identity of the community. The map, therefore, aims to visualise the multiplicity of these cultural manifestations, indicated as **'Spaces of Tradition'** (cultural and spiritual) documenting the places that traditionally were related to the intangible cultural heritage of Amatrice. For example, the group described an important religious procession of the 15th century named '*Madonna della Filetta*'. From the historic centre, during the procession the community crossed the *Tronto* river to reach the Church of *Santa Maria dell'Ascensione* or *Filetta.* This was built as memorial to a miraculous event that occurred in 1472 when, on the day of Ascension during a thunderstorm, the shepherdess Chiara Valente found a cameo of Diana the Huntress, in which she identified the image of the Virgin. Since then, this event is remembered every year with a solemn procession along the path that leads from Amatrice to the Sanctuary and the *Madonna di Filetta* who has become the patroness of Amatrice.

Some places were depicted simply as 'beautiful'. Here the aesthetic value was predominant over the others. The narrow alleys which constituted the urban pattern of Amatrice historic centre were considered significant by the participants in relation to their historical identity as they are typical of the medieval centres in Italy. A narrow street with medieval sandstone portals or the cloister of S. Francesco church were therefore classified as **'Spaces of Beauty'** as they have inspired in the participants a sense of the picturesque and historical. **'Spaces of Culture and Education'** are those where there was a cultural exchange. For example, **P9** indicated the local library, located in the S. Giuseppe church, as the place where his books were conserved, expressing a strong attachment to that place. Finally, the

group identified **'Spaces of Play'** (Fig. 7.10) which comprise of the main green areas -public and private- where the children used to play. These spaces were deemed important for the community especially during the holiday period, as they reflect a change in the town's demography. In fact, during summer the historic centre was populated by young generations who would spend their school break with their grandparents. According to the demographic analysis of Iachelini and Rinaldi (2018, 60), the highest percentage of population is aged between 45 and 64 years. These, most of whom are married, are the parents of the youngest generation, who represent a much lower percentage than the rest of the population. Thus, during the summertime, the spaces of play acquire a higher value as the demography of the population changed drastically, favouring outdoor activities and games.

The adoption of this type of collaborative mapping supports alternative narratives of the urban settlement and its heritage. It provides personal meaning that goes beyond specialist and technocratic discussions about reconstruction. As well as highlighting the different values embedded within the places, the map can be used as a tool to guide future reconstruction, managing the change of the individual heritage assets.

Figure 7.9: Mapping symbols. In this image, it is possible to note the different annotations and symbols that the participants used to highlight the values of Amatrice's heritage on the map. Here they use 'hearts' to point out the emotional value of the selected buildings. The symbols include an explanation of why they were attached to that building.

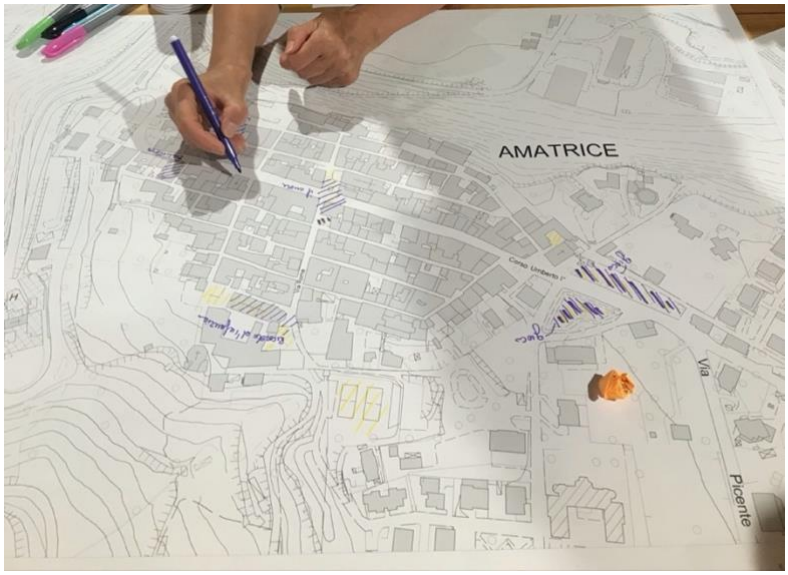


Figure 7.10: Mapping symbols. The participant is providing their personal interpretation of the space. The centre of Amatrice (the intersection of the two main streets) is highlighted and defined as the "heart of the city", the gardens and parks are indicated as "space for play". @images by the author

7.7 Interactive map of the values of Amatrice historic centre

As discussed in the previous section, the purpose of the map is to generate a debate on the resilience of the historic centre of Amatrice. The modern history of Italian earthquakes and the way in which they were managed demonstrates the need to include the community in the reconstruction process, integrating scientific and technical knowledge with local knowledge. Through the lens of resilience, the map documents the values associated with the cultural heritage of Amatrice, to inform conservation and reconstruction practices. Indeed, as well as reconstructing the original shape of the buildings damaged by the earthquake, it highlighted the importance of reinstating the values attached to it in order to recreate a sense of communal identity. While the methodological approach for the mapping follows the same steps adopted in the York case study, the layers proposed are different with more focus on presenting the tangible and intangible values within the historic centre of Amatrice. Thus, the map's layers present the reflections and experiences of the Amatrice community collected during the workshop.

As for the case of York, the online map is created through ArcGIS online. The following images (Figs. 7.11, 7.12 and 7.13) show the map's configuration. The design includes a legend displaying the different layers of meaning ascribed to the spaces. By pressing the '*about'* button it is possible to read the information relative to the map and the PhD project. It is also possible to consult the map from any device (smartphone, tablet and laptop) by clicking the following link: https://arcg.is/ObyDa

The development of the interactive map of Amatrice included the following methodological steps. The first stage was the thematic coding analysis of the July 2019 workshop data and the creation of the value-layers described above using GIS software. A prototype of the map was then created in ArcGIS online and presented in the second meeting in December 2019 to key participants of the workshop who agreed to provide feedback and useful insights. From these meetings, it was suggested to include in the maps both the historical images of the buildings and

more recent images from before the 2016 earthquake. The historical photographs (Appendix 7,7.2, Fig.25) were provided by Mario Ciaralli, president of the Cola dell'Amatrice Cultural Association. The more contemporary images were selected using Google Maps.

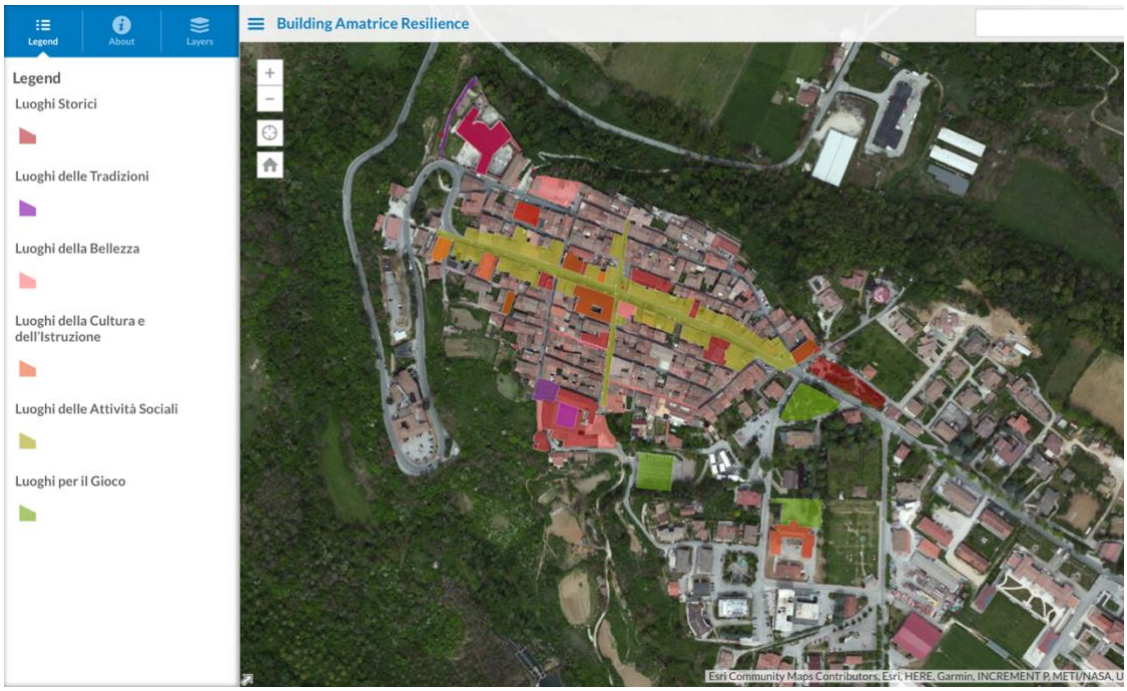


Figure 7.11: The map of the historic centre of Amatrice with the different value categories.

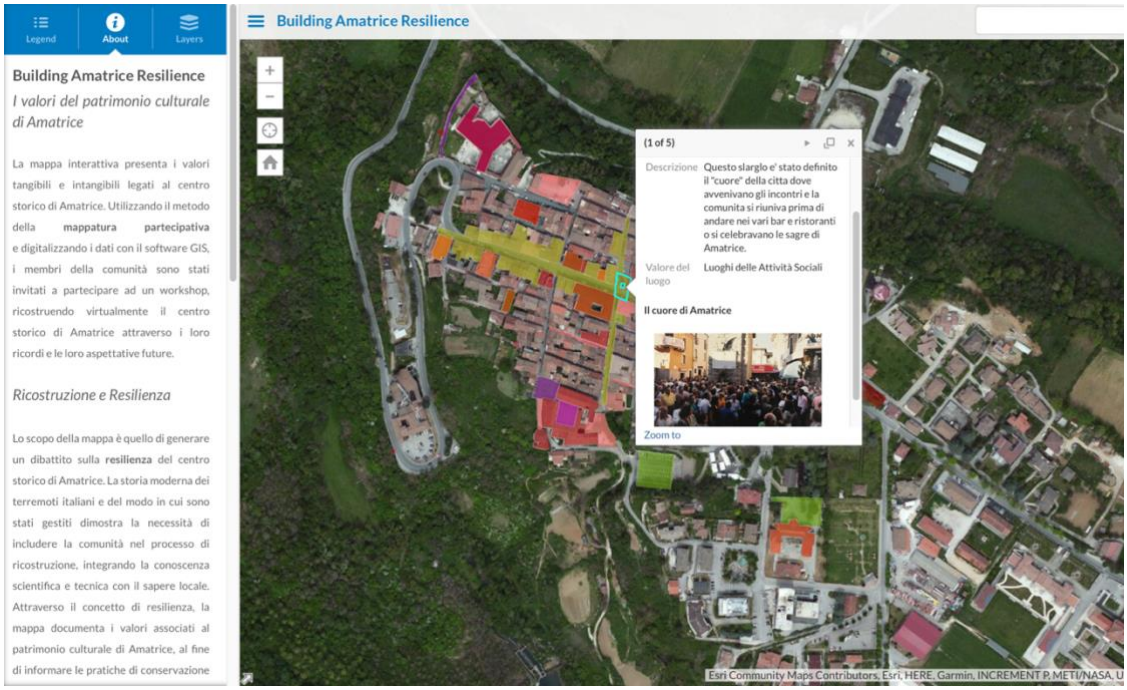
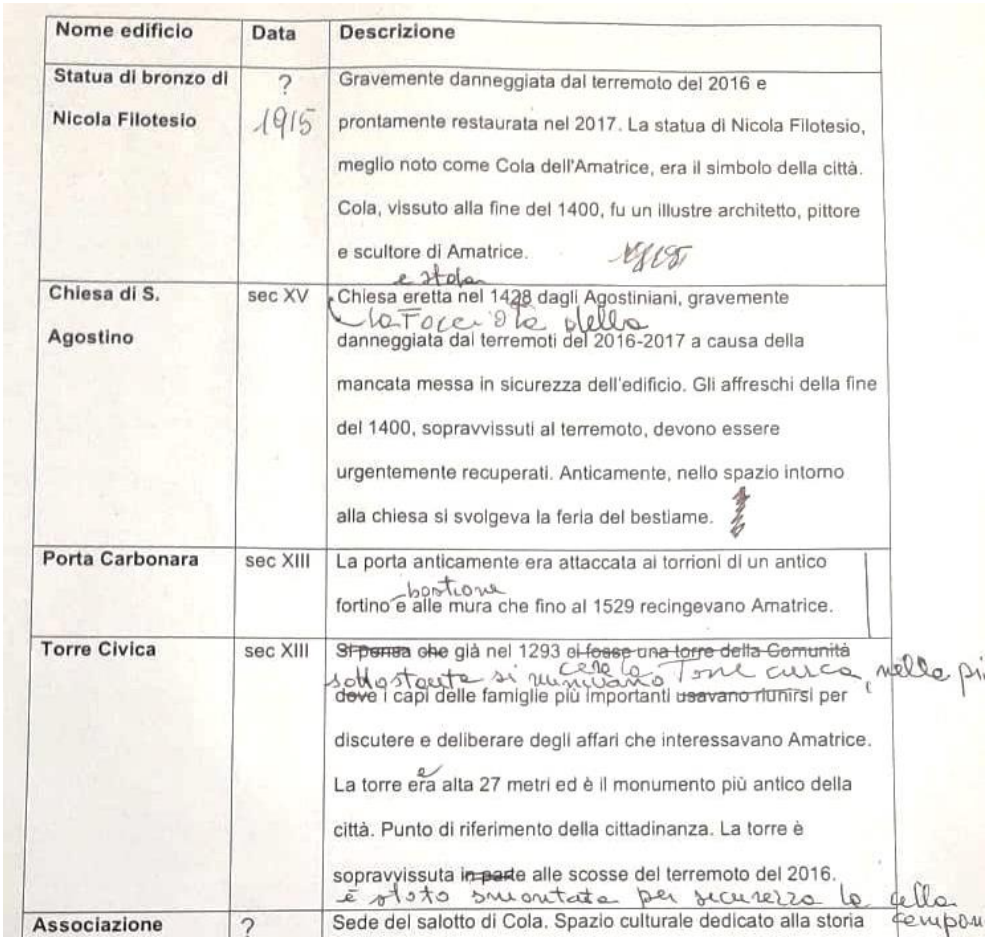


Figure 7.12: Interactive map functionality. (Left) The "About" icon description of the project and how to use the map; (Right) The pop-up window with information relating to the recorded spaces. In the example the "Heart of Amatrice" is shown, it is the main square where the most important public events took place that involved the whole community. @images by the author

Figure 7.13: Interactive map functionality. Historic images are recorded and displayed in the map. Above, the main street Corso Umberto I is highlighted.

Participants also suggested including a short description of the recorded buildings to summarise the observations of the workshop. They recommended that this should be complemented with historic accounts from secondary sources of data that they would recommend. Furthermore, as shown in figure 7.13, one participant offered to read and provide comments on each section of text that was created for the map (see additional data spreadsheet "GIS Mapping value Amatrice"). This interactive collaborative process is characteristic of each map design phase. Thus, all of the information relative to the recorded buildings is drawn from the participants' knowledge and suggested literature.



Nome edificio	Data	Descrizione
Statua di bronzo di Nicola Filotesio	? 1915	Gravemente danneggiata dal terremoto del 2016 e prontamente restaurata nel 2017. La statua di Nicola Filotesio, meglio noto come Cola dell'Amatrice, era il simbolo della città. Cola, vissuto alla fine del 1400, fu un illustre architetto, pittore e scultore di Amatrice. è stata
Chiesa di S. Agostino	sec XV	Chiesa eretta nel 1428 dagli Agostiniani, gravemente danneggiata dai terremoti del 2016-2017 a causa della mancata messa in sicurezza dell'edificio. Gli affreschi della fine del 1400, sopravvissuti al terremoto, devono essere urgentemente recuperati. Anticamente, nello spazio intorno alla chiesa si svolgeva la feria del bestiame.
Porta Carbonara	sec XIII	La porta anticamente era attaccata ai torrioni di un antico fortino e alle mura che fino al 1529 recingevano Amatrice.
Torre Civica	sec XIII	~~Si pensa che~~ già nel 1293 ci ~~fosse una torre della Comunità~~ dove i capi delle famiglie più importanti ~~usavano riunirsi~~ per discutere e deliberare degli affari che interessavano Amatrice. La torre era alta 27 metri ed è il monumento più antico della città. Punto di riferimento della cittadinanza. La torre è sopravvissuta ~~in parte~~ alle scosse del terremoto del 2016.
Associazione	?	Sede del salotto di Cola. Spazio culturale dedicato alla storia

Figure 7.14: Map metadata. Example of suggested changes to text from a participant. The first column includes the name of the recorded building, the second displays the year of construction and the third contains the historic description. @image by the author

During an informal chat with some of the workshop participants, I noted that the use of images and historic descriptions in the map would be a significant way to communicate the values embedded in the cultural heritage of Amatrice which were compromised by the earthquake and subsequent demolitions. Therefore, the resulting interactive pop-up windows connected to the recorded spaces contains the following descriptors, as shown in the figure 7.14:

- Name of the building
- Historic period
- Description
- Value of the place: this can contain overlapping categories of value
- Pictures: historic and recently before the 2016 earthquake

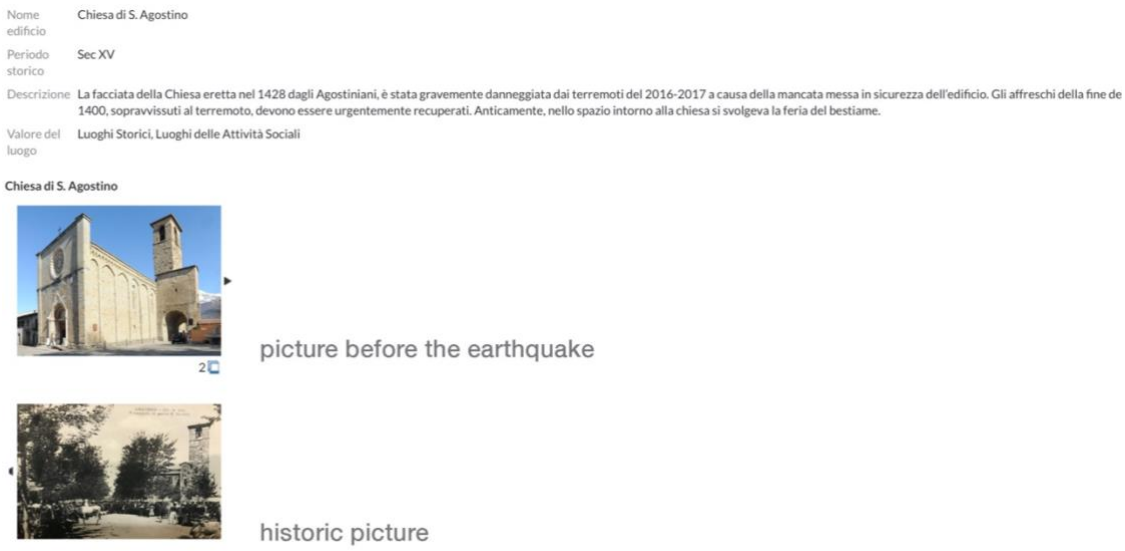


Figure 7.15: Map information. A detail of the pop-up window of the church of Sant'Agostino. In the description, the community decided to address the urgent need to save and safeguard the 15th Century frescoes that survived the 2016 earthquake. The historical image shows that a cattle market was held in the space in front of the church. This adds to the historical value of the church as well as the social value. @image by the author

7.7.1 Analysis of the Map:

During the collaborative mapping workshop, a total of 35 buildings and public spaces were recorded. Significantly, the visual analysis of the map shows that historic value and social interaction are the most prevalently reported values. The latter encompasses the area surrounding and including the two-main streets of the historic centre, *Via Roma* e *Corso Umberto I*. This finding, illustrated in table 7.4, supports contemporary theory within heritage conservation (i.e. Jones 2017; Avrami 2019) which recognises the importance of social value to determine the significance of a historic environment. Indeed, relying only on specialists' assessments of value traditionally led to a scientific approach to heritage, and a failure to capture the complexity of values derived from the community experience within the territory. In the case of Amatrice, the use of a collaborative and bottom-up approach shows the presence of different categories of values. This includes originally reported local values that reflect the habits of the community, such as those embedded in the 'spaces of play'.

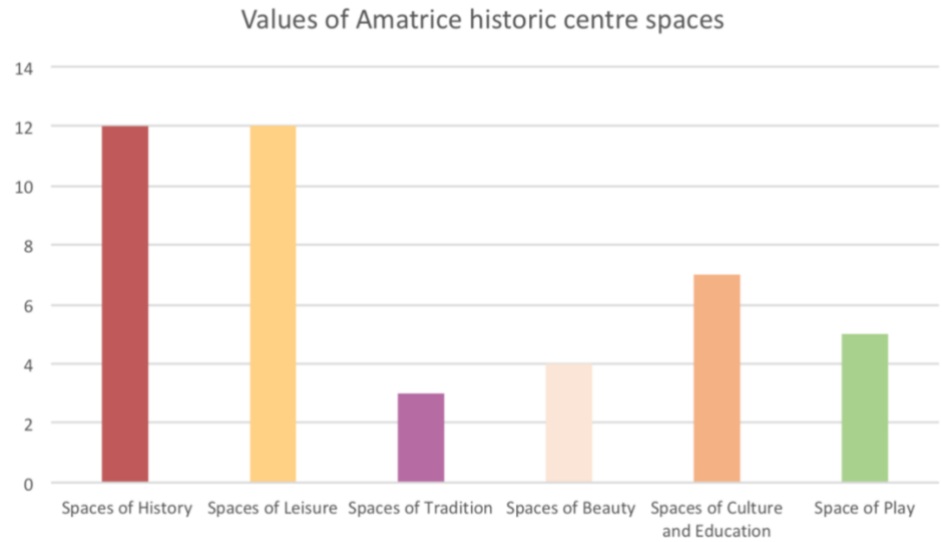


Table 7.4: Bar chart of the values recorded in Amatrice during the collaborative mapping workshop. The chart displays the different values indicated by the participants (x), and the instances of buildings for which they were reported (y). It is of note that the most highly reported values were Spaces of History and Spaces of Leisure.

7.8 Conclusion

This chapter shows participatory mapping with stakeholders can be used to explore the relationship between resilience and heritage values in Amatrice. The dramatic material loss suffered by the Amatrice community after the 2016 earthquake poses a question of how to rebuild the connection between the community and the historic centre. This collaborative map assists in recovering local meanings and values which can inform guidelines for future reconstruction. This chapter demonstrates that community participation can play a crucial role in contributing to the understanding of resilience in historic centres destroyed by an earthquake. From the analysis of the participants' experiences after the 2016 earthquake, the top-down institutional approaches and exclusion of local knowledge created a great deal of tension. Words such as "individual" and "protagonist" were used by the workshop participants to describe the governmental response as they wanted to underline the top down approaches used by the State. These descriptors stand in contrast to the community's desire to be involved in the reconstruction and decision-making process. Due to the lack of physical context and the destruction of its cultural heritage, it was necessary to define the local values that constitute the place's identity in order to be able to depict the resilience of the historic centre of Amatrice. Therefore, this study of resilience stems from memories and traditions. Here, the participation of the community is fundamental to reflect on the correlation between values and resilience.

The data gathered using qualitative methods provide a crucial insight into the perception of resilience, risk awareness and the role of the local seismic culture in the historic centre of Amatrice. The main issues discussed by the group highlighted the top-down approach adopted by the various institutions which overlooked the different voices of the community, including local expert knowledge. This was shown to lead to a sense of detachment and undermined the identity of the community. Resilience was understood by participants as a pro-active characteristic of the system but also it was recognised as a technical component in terms of resistance

and structural stability. The reconstruction approach was another theme discussed during the workshop and in the questionnaire. The predominant desire of the community was to recover its identity through the reconstruction of the lost cultural heritage. The question of authenticity was discussed, reframing the concept of "*com'era dov'era*" in terms of the recovery of the traditional architectural elements integrated in anti-seismic structures. Finally, the last section illustrates the potential of collaborative mapping as a holistic method able to integrate tangible and intangible knowledge. Social value has been considered paramount for the historic centre of Amatrice, defining a strong identity for the community in relation to the urban context. It is interesting to explore the social dimension of heritage, considered by Jones (2017, 21) as pivotal to understanding the historic significance of a specific environment associated with people's identity and memories. In Amatrice, the experimentation with social participative methods is intended as an alternative approach to the expert-driven assessments to enhance the resilience of a historic centre.

8. (Un)framing the understanding of resilience

This chapter engages in a comparative discussion of the results presented in the empirical chapters (5-6-7). First, the rationale adopted to structure the discussion is explained. Three common themes will be used (see below) which deductively emerged from the evaluation of the data collected during the research activities in the cities of York and Amatrice. The following three themes will guide the discussion:

1. The role of local disaster culture for building resilience
2. Community participation in disaster preparedness and response
3. PGIS and maps: tools for community empowerment and resilience

The choice of these three themes is closely connected to the contextual narrative of the participants' disaster experience in the historic centre of the two cities. This draws from a burgeoning area of literature that complements the embodied human-centred nature of this research. Recent studies on cultural memory, co-production and heritage will be used in support of the qualitative data that were gathered in my research. Overall, the following discussion aims to link the three themes to the main research question: *"How can the resilience of historic buildings located in seismic and flood risk areas be represented and assessed in relation to the local community and its heritage values?"*. This will draw upon issues of how culture, community participation, new technologies, and heritage conservation are permeated with resilient approaches examined in the two case studies.

The first theme investigates the role of the local disaster culture as it characterises the resilient practices in the two case studies. Here, the value of traditional knowledge through conserving memory and enhancing risk perception is

explained, raising a key question about who the guarantors of the future sustainability of the local disaster culture are. The second theme concerns the issues of community participation and engagement. The account of the case studies demonstrates the urgent need to include multiple voices and values in the daily practice of cultural heritage conservation and management in areas at risk. This contrasts with the adoption of top-down approaches and technocratic responses to disasters, underlining the sense of ownership of local stakeholders in the decision-making process for the conservation of their heritage. The third strand in the discussion is a reflection on the methodology used. It examines significant aspects and limitations of digital technology and collaborative mapping techniques that have been highlighted by the research. The method adopted, which is a key component of the research, depicts the complex aspects of resilience in historic centres exposed to catastrophic events at a local level. The use of interactive mapping to describe resilience via mixed research methods is a novel approach, and is rooted in the local disaster culture of both historic centres analysed.

The final part of this chapter will describe how the understanding of resilience emerged in relation to the adaptation practices recorded in the two cities. As the title of this chapter suggests, a single framework for resilience is not formulated as the processual and contextual aspects of resilience are emphasised. The elements that have influenced resilience in the two different contexts are discussed, including the tangible and intangible coping mechanisms used to 'move forward' while maintaining continuity with the past. Considering the experimental nature of this research, a new body of literature is introduced to examine the emergent relationship between heritage and resilience. This transition opens future lines of investigation that undermine the orthodoxies of stability in heritage by embracing the notions of uncertainty and adaptations. Finally, drawing upon the comparative discussion and recent theories in the heritage field, resilience is described as a 'creative process'. This new conceptualization will offer a flexible framework for a further discussion on resilience and built heritage at risk due to extreme natural events.

8.1 The role of local disaster culture for building resilience

Throughout this thesis, the dynamic interaction between culture, risk and resilience is emphasised by relating these concepts with aspects of human and institutional behaviour, and with tangible aspects of cultural heritage. The initial argument of this study contends that local flood and seismic culture shapes the architectural landscape and community response to extreme natural events. As noted in section 2.2, a consistent body of literature (Rudofsky 1964; Oliver 1987; Piesik 2017) highlights the relationship between different indigenous knowledge - in terms of technologies and strategies - and the variation of climate and resources. By considering this symbiotic relationship, resilient and sustainable practices become sources for a community's cultural identity and respond to external natural hazards.

For this reason, the first step towards the comparative analysis is to discuss how the local disaster culture has influenced the resilience demonstrated in the two case studies. Despite the historic frequency in catastrophic natural events in the two cities, the results show that the local disaster culture, in terms of coping measures and behaviours, has gradually disappeared in both cases over the past few centuries. However, the reasons behind this 'cultural disaster' fragmentation are manifold. These depend on the different social and cultural contexts and on the institutional response to the emergency. The disappearance of the local flood culture in York is related to the prevalent use of physical infrastructure such as structural barriers and gates. These measures profoundly change the relationship between the community and its environmental landscapes, reducing risk awareness and the agency of individual citizens. In contrast, the social and economic decline of Amatrice has strongly impacted the quality of the buildings' construction. Furthermore, all traces of a traditional anti-seismic construction culture have been erased by the pervasive use of incompatible building materials (i.e. reinforced concrete) in the historical fabric and the lack of appropriate reinforcement techniques. This reveals a jarring dissonance between the risk exposure of the city and the strategies adopted to cope with it in terms of application of building codes and technologies used. The next section will examine the intimate relationship

between the loss of the local disaster culture with the altered perception of risk and the fragile memory of past disasters.

8.1.1 Risk perception and disaster memory

Based on the evaluation of both case studies, it can be argued that the local disaster culture of a place relies deeply on risk perception and the memory of catastrophes. These two themes are features that represent the qualitative aspects of 'resilience thinking' in the disasters field. While risk perception is fundamental to developed strategies against disasters such as risk analysis and policy-making (Slovic 1987), the memory of previous disasters relates to people's risk awareness in terms of collective knowledge about their environments (Le Blanc 2012; McEwen et al. 2016). From the GIS map analysis of both historic centres (see Figs. 6.2 and 7.2), risk perception before the disaster was remarkably low despite the buildings being located in a high-risk area. This distorted risk perception is defined by Smith and Petley (2009, 63) as 'dissonant perception' which refers to a denial or minimisation of risk. This conceptualization of risk, even if dissonant, helps people endure their recurring exposure to external hazards such as floods or earthquakes.

Along the Foss area in York, people's perception of risk is strongly connected to the reliance on structural measures, even after the 2015 experience. By comparing the historic flood maps of York (data.gov.uk), it is interesting to note that the impacts along the River Foss of the 1982 flood were similar to those of 2015. Indeed, that area was protected by the Foss Barrier, constructed in 1987, which isolates the River Foss from the Ouse and has protected the city on several occasions, including the floods of 2000, 2007 and 2012 (EA 2016). Such observations highlight that the risk perception of a certain community depends on the location of buildings and their exposure to flood events. This inevitably has an impact on the adaptation measures (see section 8.4) used in the historic buildings along the two rivers. Conversely, in Amatrice, the alteration of the perceived risk was caused by the timeline of the nearby L'Aquila earthquake which has led some to

believe that a similar severe seismic event will not repeat itself for a long time. From the discussion with the participants, it emerged that no preventive measures were taken after the earthquake in L'Aquila in 2009. This lack of response was determined by the dissonant risk perception, as no one expected another earthquake after so few years. Interestingly, the GIS analysis shows that after the 2016 earthquake, there has been a drastic change in the perception of risk within the population, who are now inclined to expect similar events in a shorter period of time. The relation between perception of risk and timeframe of a disaster diverges deeply from York's example. Indeed, in the English case study, the long length of time between the floods event in the Foss area led to memory loss of flood risk. This has deeply influenced the lack of preparation of the community affected by the flooding despite growing public understanding of the impacts of climate change and increased likelihood of flooding.

If risk perception is determined by the complex interaction between cultural factors of society (Smith and Petley 2009, 62), it can be argued that is also strongly connected to the associated past -direct or indirect- experience with natural hazards. This manifests in the form of memory. Memory plays a crucial role in the conservation of cultural heritage and in establishing a strong relationship between people and place. Memory of catastrophes is framed using the distinction provided by Assmann and Czaplicka (1995) between 'communicative memory' and 'cultural memory', which entails official and unofficial narratives of disasters. While 'communicative memory' is non-hierarchical and based on everyday communication – such as in the immediate aftermath of a disaster – 'cultural memory' is "a collective concept for all knowledge that directs behaviour and experience in the interactive framework of a society and one that obtains through generations in repeated societal practice and initiation" (Assmann and Czaplicka 1995, 126). Places and monuments, whose significance is linked to catastrophic events, are a powerful vehicle to express the cultural memory and therefore the identity of a community. In addition to these definitions, in both case studies, participants shared memories of national and international disaster experiences which they used as examples when

referring to their own personal experience. This bank of memories and knowledge has been defined in section 6.2.2 as 'cultural disaster parallel', which contributes to community risk awareness and perception. Indeed, the reference to other national and international catastrophic events enriched the discussion with the participants by offering a model coping mechanism to make sense of their own experience. For example, **P4** (Appendix 4, 4.1,9), referring to the Japanese tsunami experience, emphasizes the importance of having geographical or physical elements that remind the community of the severity of the catastrophic events of the past. The "continuity project" represented by Venzone was taken as a model for a future reconstruction of the historic centre of Amatrice.

While reflecting with the participants on the meaning of resilience, in Amatrice, the role of memory has often been stated as crucial to maintaining continuity with the past (see section 7.3). **P7** (male, architect and member of the City Council of Amatrice) affirms that:

> *"Il termine resilienza per me è essere resistenti senza dimenticare il passato" (P7 Appendix 4, 4.6, 7)*

> *"The term resilience for me is being resistant without forgetting the past" (P7)*

Therefore, it became apparent that preserving the memory of the disaster is part of the resilient approach. During the same activity in York, participants pointed out that "Learning from past experiences" (post-it quote section 6.3) is a way to enhance resilience. This interpretation attributes to memory an active and didactic value based on the critical recording of past experiences. The Flood 'memorialisation' (see section 5.1) of past flood events through epigraphic marking around the city, however, has proven to be an ineffective strategy to raise collective risk awareness. On the contrary, citizen-led actions of the 'Red Tower project' which include

displaying in the building pictures of the 2016 flood and the recovery process are a more meaningful way to embed flood memory into the broader narrative and use of the building. In the same way, the production of the pamphlet of Amatrice's cultural heritage, edited by the 'Comitato Civico 3e36', is an attempt not to forget the historical-artistic values of the city centre, on which the community wants to build for its future reconstruction. These examples nurture "cultural or collective memory" using a bottom-up approach. Indeed, in both cases, the community stakeholders are engaged in producing objects that can enhance the collective disaster memory, highlighting the values that are significant from their personal experience. This change in the 'production of memory' offers a new perspective on the previous definition of "collective memory" which is traditionally top-down and conveyed by the "culturally institutionalized heritage of a society" (Assmann and Czaplicka 1995, 131). This brings into question who the guarantors of disaster memory and risk perception are. Historically, in societies highly exposed to natural hazards, it was crucial to develop risk and crisis communication strategies able to nourish the local disaster culture. As previously discussed, the local disaster culture has tangible and intangible elements that can preserve memory of disasters and enhance the community risk perception. The commemoration of a disaster cannot rely only on physical manifestations that become the symbol of the event (such as epigraphic marking; texts or monuments), but must involve the community in the dissemination and production of information. The Red Tower case study demonstrates that citizen-led activities, supported by local institutions, can preserve and promote collective memory within the community. From a community perspective, the production of original content (i.e. photographs, brochures or descriptive panels) provides a more proactive narrative of disasters to be passed onto future generations.

Arguably, this could lead to a shift from the paternalistic discourse on disaster-risk promoted by the institutions, which inevitably frames the community as the victim of natural calamities. Citizen participation in conveying memory and solutions reflects resilient thinking in terms of social learning and adaptation. However, the case of Amatrice reveals that local and national institutions also have a responsibility

to ensure the continuity of best construction practices in response to extreme natural events. This can be effectively executed by promoting and enforcing the use of building codes and construction guidelines. Similarly, in York, insurance companies which required only like-for-like replacement of materials damaged by flooding (based on a low estimated risk of frequent flood events) actively discouraged repairs that would have promoted long-term resilience. While some engagement is required, it is unrealistic to place total responsibility for a resilient approach on community members. Therefore, both case studies support more transparent and direct communication between institutions and citizens to promote change in risk perception. This leads to the next theme where the role of the community in disaster preparedness and response is fully explored.

8.2 Community participation in disasters preparedness and response

As discussed in chapter 3, community plays a central role in the realisation of resilient practices and thinking in both disaster management and the heritage conservation field. Stakeholders and activists create a remarkable and hopeful response in a time of crises. Solnit forcefully elucidated this dynamic in her acclaimed book, *A paradise built in hell* (Solnit 2010). Here, the resilient and resourceful nature of human behaviours and actions that rise amid disaster emergencies is celebrated. Acts of generosity and strength are documented in five different post-disaster contexts, which undermine the dominant disaster narrative based on systemic vulnerabilities and community fragility. P9 (male, engineer Appendix 4, 4.6, 9) describes the months after the Amatrice earthquake as being characterised by people's solidarity and assistance to one another. Examples of citizen-led activities for the protection of cultural heritage in both Amatrice and York, described in chapter 5, support Solnit's thesis. The post-disaster institutional "vacuum" and unbalanced power dynamics noticed by the citizens ignited local activities to rescue damaged assets.

However, the social and political reality in the aftermath of a disaster is often shaped by capitalist ideology which privileges the wealthy classes and supports a

hierarchical decision-making process. Activist journalist Naomi Klein has famously designated this mechanism as 'disaster capitalism'. She refers to Milton Friedman's economic theory that encouraged the "exploitation of large-scale shocks or crises" (Klein 2008, 7) to promote neoliberal policy agendas. Analysing different case studies such as the aftermath of the hurricane Katrina, Klein advocates that a collective state of shock is a fertile ground for political and economic manipulation and opens a "window of opportunity" for exploitation provided by disaster crises (Klein 2008, 458). While examining the L'Aquila earthquake through the lens of disaster capitalism, Imperiale and Vanclay (2020) provide the following comprehensive definition of the term:

> Disaster capitalism emerges from the pre-existing social risks and vulnerabilities, and facilitates rent-seeking, elite capture, organised crime infiltration and corruption, creating environmental and social impacts and human rights violations, further worsening local social risks (e.g. local inequity and social exclusion) and vulnerabilities in a downward spiral, while undermining the positive feelings, attitudes, and behaviours that enable members of affected local communities to collectively learn, transform and build resilience
>
> (Imperiale and Vanclay 2020, 19)

Post-disaster interventions, carried out by the state in collaboration with the private sector, which exacerbate previous unfavourable conditions, are opposed to resilient practices including social learning and socially-sustainable transformations. In light of this, the dynamic relationship between agency, power and resilience is emphasised. More recent critiques of the notion of resilience (Cannon and Müller-Mahn 2010; Béné et al. 2012; Davoudi et al. 2012), stress the lack of reflection on social dynamics and power issues within resilient frameworks. The agency of individuals, intended as the "freedom (that) people have to negotiate their own lives (including their own resilience) in face of adverse circumstances" (Béné et al. 2012, 12) is concealed in favour of the broad adaptive ability of a system. Arguably, the

generalization of a collective response of a "system" in adaptation obscures the various actors' responsibility in the reconstruction process. This study advocates for a clear distinction of roles between the citizens and institutions by improving communication of risk and response. The coordination of different stakeholders is necessary to enact resilience practices. This should be complemented by institutional transparency and accountability in the decision-making process and the valorisation of individual and collective capacity (Imperiale and Vanclay 2020, 2). From this standpoint, it can be argued that the concept of agency can be related to the ownership of cultural heritage as expressed by Byrne (2008) in chapter 3. Indeed, the sense of attachment and ownership is created by the social activities of the community engaged with its cultural heritage (Byrne 2008). The experiences of the Red Tower Project and the 'Comitato Civico 3e36' are significant example of how stakeholders can assert strong control over a site without owning it legally, by promoting social action. These groups reclaimed their agency associated with their cultural and emotional ownership of local heritage, consequently enhancing its resilience.

The relationship between cultural heritage, local community and state institutions is often intertwined with dynamics of power and ideologies that can lead to conflict and oppression (Silverman and Ruggles 2007, 3). In modern times, The Universal Declaration of Human Rights (1948, Article 27) defines cultural heritage as a crucial aspect of human rights: "Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits" (UNITED NATION 1948). This message has been powerfully echoed worldwide by UNESCO in both the 1954 and 1972 conventions and in Europe through the Faro Convention (2005). Here, the idea of public ownership of cultural heritage has been introduced, protecting the rights of citizens to access and experience cultural heritage. However, the idea of global heritage is clearly not fully realised. This principle is limited by national and state domination which limits the public's right to be an active part in the decision-making processes related to cultural heritage (Kobyliński 2013). In the case of Amatrice, it has been

demonstrated that during emergencies or shocks, the role of the state and cultural agencies becomes predominant by claiming their 'ownership' of the territory. This is executed regardless of the local dynamics, values and expertise connected to the management of cultural heritage. This dynamic is fully explained by **P3** (Appendix 4, 4.6, 3) who, despite her expertise, felt deprived of the possibility of participating in the recovery process and conservation of the damaged cultural artefacts of the city museum.

Examples of 'disaster capitalism' are arguably present in both case studies, yet in different forms and intensity levels. This imbalanced power dynamic has been discussed in chapter 5, highlighting the difference between "legitimate" (specialist or authoritative) and "illegitimate" (lay) knowledge. Participants argue that the communication and recovery approaches were characterised by top-down decisions from the main institutions and insurance companies. This approach exacerbated the sense of helplessness that was evident in the language used during the focus groups' discussion. In the case of Amatrice, the participants' use of passive language in describing their experience after the earthquake highlights the power imbalance between the state and the citizens and the feeling of social exclusion. Examples of passive words were noted especially within participants who were retired and older and therefore further excluded in the reconstruction process. This highlights the contrast to the pervasive techno-scientific language and top-down planning used to provide temporary housing and emergency measures. In the York example, building recovery and response was down to individuals rather than state-level. However, as described in the previous section (8.1.1), in the Huntington Road area (**P4** Appendix 4, 4.1, 22), the insurance companies drastically limited the opportunities for resilient and innovative solutions.

However, as discussed in chapter 5, national institutions, such as the EA and MiBACT played a different role in the two case studies in their relationship with the citizens. Thus, what emerges is the power imbalance between national and local institutions and the main stakeholders connected with the cultural heritage. This

dynamic is characterised by a hierarchical structure in the management of cultural heritage, undermining the individual agency of the citizens. The next section examines in more detail the level of community participation and preparedness in the two case studies. This raises questions around the effectiveness of resilience policies and guidelines such as the 'Sendai Framework for Disaster Risk Reduction 2015-2030' and ambition to "Build Back Better" fostering stakeholders' preparedness and engagement.

8.2.1 Preparedness and community participation: A new utopia?

As discussed above, preparedness is a crucial element in major international guidelines in the field of disasters, such as the Hyogo Framework (2005-2015) and the Sendai Framework (2015-2030). In addition, preventive practices are also promoted by leading cultural heritage conservation and management institutions such as UNESCO, ICOMOS, ICCROM and the Getty Conservation Institute. In the Getty "Principles for the Conservation of Heritage Sites in China", disaster prevention includes "taking measures to eliminate threats" (ICOMOS China 2015, 70). These measures include maintenance, monitoring, response, rescue plan, mitigation, disaster assessment and dealing with damaged structures, but also consider principles for structural protection and interventions (article 15). From a theoretical point of view, this marks a paradigm shift from a 'culture of reaction to a culture of prevention', referring to the call made by the UN Secretary-General Kofi Annan in 1999 (UNITED NATION 1999). This shift is deeply entangled with the resilient framework, in terms of learning and adaptation where community participation becomes central. This study interrogates whether we are still deeply rooted in a reactionary culture regarding the adaptation and management of historic buildings in risk areas. In the two historic centres, prevention practices have been developed differently depending on the level of the local disaster culture.

The analysis of the 'Repairing Approaches' map (Figure 6.3) in York shows that resilience measures are widely used along the river Ouse. This demonstrates

that a culture of prevention is more established in areas that are frequently and highly exposed to flood events. Indeed, the presence of structural measures against the flooding, such as the Foss Barrier, have altered the immediately local resident's perception of risk. This dependence on the technocratic response resulted in a failure to adapt historic buildings located along the Foss River. The Merchant Adventurers Hall's refurbishment works in the 1990s, discussed in section 6.2.4, are exemplary of the lack of flood risk awareness that exacerbated the damage to the building during the 2015 flood. As described in chapter 6 the recent interventions have increased the overall resilience of the building remedying the mistakes made previously. Lack of adaptation includes non-structural measures as well as measures related to the overall preparedness in the management of cultural heritage. A clear example is provided by the experience of **P6** (Appendix 4, 4.1, 10) who was working in the York Army Museum during the 2015 flood. He expressed a sense of helplessness in the face of the emergency as there was no action plan for the museum, which should have been in place in accordance with professional standards and to support staff (e.g. Dorge, Jones and Getty Conservation Institute 1999). By encouraging participatory and cooperative activity within the members of staff, the confusion and helplessness experienced by **P6** could have been avoided. Moreover, collaboration on the design and implementation of emergency plans would support local cultural organisations in sharing resources, best practices and information for the identification of risks.

Arguably, the main post-earthquake issue in Amatrice was an evident lack of communication between citizens and the main institutions which operate in the area. As described in chapter 7, top-down approaches and community exclusion inevitably lead to a fragmentation of the community and contribute to the feeling of "estrangement" (Clemente et al. 2017) from their territory. The sense of detachment from the historic centre has been exacerbated by removing the community from the decision-making process. This issue is also reflected in the absence of norms and policies that could foster community participation. Indeed, the MiBACT instituted a special office for the areas affected by the 24th of August 2016 earthquake, to

guarantee unitary action for the various interventions. It is interesting to note that local knowledge and local specialists are not mentioned in the documents and guidelines for the reconstruction. The general directives are focused on providing a technical response to the state of emergency, and only the official interpretation of buildings historical value was used to prioritise their reconstruction. In the section *Ricostruzione e Comunità* (Reconstruction and Community), it is interesting to note that the community is depicted as a 'beneficiary' of the MiBACT work, assuming a passive role during the process of reconstruction. The Italian policy reflects the lack of community engagement and participation experienced by the Amatrice community. Consequently, other issues have been raised, namely: detachment from the historic centre, community displacement and erasure of cultural identity. In summary, these results show that the decision-making process in the aftermath of the 2016 earthquake used a top-down approach, in which the community voice and needs were ignored. The focus group acknowledged a lack of preventative measures in terms of structural safety and cultural understanding of risk. While, in the case of an earthquake, it is impossible to control or foresee circumstantial factors such as seismic intensity and epicentre which affect the structural stability of buildings, a culture of prevention and response is necessary to mitigate its damage. Those considerations had been disregarded by local and national governmental institutions in the case of Amatrice. During the focus group post-it activity, participants underlined the importance of adopting preventative measures to enhance local resilience. The above discussion highlights the gap that can occur between international resilient theories and policies and the documented disaster management in the two historic centres. However, it is significant to note that while in the UK resilience is growing in the political narrative, in Italy, the lack of policy that supports community practices and engagement limits the application of resilient frameworks. The next part of this chapter will focus on the discussion of the experimental resilience mapping method implemented in this research which favours participatory practices and was designed to test the potential to support local stakeholders.

8.3 PGIS and maps: tools for community empowerment and resilience

The third strand of this discussion highlights the strong relationship between resilience and the advancement of new technologies in heritage and conservation studies, such as PGIS and collaborative mapping. The use of digital and social methods offer an alternative to the established notion of 'Authorised Heritage Discourse (AHD)' (Smith 2006) by including a multitude of voices and interpretations. The role of GIS mapping techniques in nurturing participation has been crucial to address the main research question of visualising and depicting resilience in both qualitative and quantitative terms. However, during the development of this research, it became evident that the use of this technique not only functioned to produce an output in terms of representing a complex concept such as resilience but produced other creative outcomes. One unanticipated output was that the process helped to raise awareness and open a dialogue within the focus group that itself added value, alongside the output of producing the GIS interactive maps. Thus, the process of creating the map became a vehicle for community empowerment by challenging the expert-driven management of cultural heritage. This process may be able to stimulate an interaction between different stakeholders and assist them to find creative ways to apply 'resilience thinking' within the recovery process. However, my research has primarily focused on the final product of map creation, rather than the process. This means exploring the potential of GIS to produce different thematic and interactive maps capable of translating the characteristics of resilience through graphic and spatial attributes. The following sections will discuss the different methods used to address the main research question, highlighting the advantages and limitations that were encountered.

8.3.1 Resilience and indicators

Given its multifaceted meaning, this study aimed to investigate a way to represent resilience by developing descriptive indicators via a mixed-methods approach. This methodology has mainly been applied to the York case study, as it relies on the

availability of information and accessibility to buildings and their users. As discussed in section 6.6, the qualitative data collected by questionnaire was combined with objective sets of information. This results in a series of selected indicators to measure and visualise the different degree of resilience in a map (from Low to High). The findings of this experimental approach (section 6.6.3) suggest that a vulnerability framework provides a misleading interpretation of building response to extreme natural flood events. The reason for this is that vulnerability assessments do not consider intangible aspects, such as adaptive capacity, risk perception and memory of past flood experiences - implying the need for learning and experimentation in this area. From a perspective that includes these factors, resilience thinking provides a holistic interpretation of reality that can better inform decision-making.

This part of the study supports previous research into the development of resilience indicators to assess the effectiveness of resilience thinking in the disaster field (Mitchell 2013, Winderl 2014, Schipper and Langston 2015). Traditionally, resilience assessments are proposed at the urban and national scale. On the contrary, the approach described in this research is designed to describe the resilience of historic buildings at the 'micro-scale' assessment level. This includes their individual response to guide future conservation and adaptation measures. However, the resilience assessment for this thesis is limited by whether the building is accessible or the data is available to the researcher. The process of collecting the data for a small sample of buildings through a questionnaire was time consuming for several reasons. First, the respondents to the questionnaire were mainly from small businesses located along the Fossgate and Walmgate area and were often reluctant to speak due to their work commitments. On some occasions, members of the public (such as the Blu Bicycle restaurant staff) who experienced trauma after the flood or due to the difficult recovery process were not interested in taking part in the research. These issues were already accounted for during the ethics application but nonetheless a significant limitation. Finally, the different cultural background and language skills between the researcher and the community were an obstacle to

building trust in the research process. This was evident when comparing the same process of participant recruitment in York and Amatrice. While my role as a researcher was as an outsider in both cases, sharing the same language and cultural background with the Italian group of participants was a crucial element in building rapport and a more natural relationship with the community.

Furthermore, presenting Amatrice as a comparative case study highlights that this method is only ideal for analysing buildings exposed to flood damage. This is because the resilience indicators cannot be applied in severely damaged urban centres where the material fabric is lost or severely compromised. In the context of Amatrice, quantitative data have been employed to provide a limited picture of how the respondents imagine a future reconstruction. The 'Reconstruction approach map" analysis (discussed in section 7.5.2) provides important insights into the meaning of the famous slogan "*com'era dov'era*". The community clearly expressed that they support an authentic reconstruction that is able to reinstate the values associated with the buildings. Moreover, the map shows the feelings of insecurity and fear associated with returning to the same territory linked to the traumatic event. From a resilience perspective, this map potentially challenges the established top-down approaches in Amatrice in relation to future reconstruction. This mapping technique can allow stakeholders to show their perspectives and desires in a visual and expressive way and provide original ways of representing citizens' knowledge and needs. Therefore, resilience GIS mapping, combined with a variety of forms of public participation, can be a powerful tool for community empowerment.

8.3.2 GIS interactive map to build resilience

This research has principally focused on the development of two interactive maps to explore their potential for community engagement and disaster culture enhancement. It is interesting to note that in both case studies the use of maps resulted in a valid tool to define meaning and reinforce a sense of place and local identity. The map in York brings together different sources of information (official and unofficial knowledge) into a unique platform. This aims to foster clearer and improved communication of risk, by engaging the community in a dialogue with local and national institutions and finally to promote local flood culture. On the other hand, the map in Amatrice, elaborated through collaborative mapping, establishes a connection between people and places rediscovering the values of the historic centre. This provides an alternative and novel narrative in the aftermath of the earthquake that seeks to rebuild the social fabric as a sense of purpose and significance. In addition, the values map of Amatrice has generated a new form of knowledge that can guide and prioritise conservation interventions and reconstructions using the same values suggested by the community. Arguably the various mapping approaches utilised in the two case studies demonstrate that there are different ways to assess and visualise the resilience of historic cities in areas at risk and suggests that this process must necessarily be tailored to the local culture and context. Significant differences are highlighted between the depiction of resilience in the two interactive maps. For instance, the structure of the York questionnaire and map design emphasises that resilience is related to the physical and behavioural solutions adopted in the buildings. Here, the concept of resilience is connected to a practice-oriented approach. This understanding of the concept is also reflected in the publications promoted by the local and national institutions to "make your home more resilient" (Historic England 2015; Environment Agency 2016b). These guidelines provide a range of technical solutions that aim to raise awareness of flood risk. In the same way, the map developed for the historic centre of York informs us about the adaptation of the building considering the physical measures used to mitigate the ingress of water and the repair approaches used.

However, the map also embraces intangible aspects of resilience, often overlooked in mainstream discourses around flooding. Indeed, as discussed in chapter 6 (section 6.4.3), the map illustrates the behavioural measures adopted by users to improve flood recovery and building response, and to improve the level of preparedness. This greatly extends the perception of resilience that is focused solely on the technical aspects of coping with flood threats.

By contrast in Amatrice, resilience is represented on the interactive map using community values and the memories of damaged heritage. The physicality of the historic buildings and their structural response to disasters cannot be a measure of resilience as in the case of York. This is due to the extensive demolition which changed the historical landscape of the city. The map presents different 'spaces' in the city in which the values defined by the participants are shown. This approach is based on the body of literature on value-based practices (Smith, 2006; Poulios 2010; 2014; Rudolff 2006; Walter 2013; Fredheim 2016), which favour the community and local perspective rather than the expert interpretation of heritage. The validity of different value classes that reflect the way users inhabit and perceive space was demonstrated in the Amatrice study. Furthermore, from the results, it is evident that the standard hierarchy of values is also questioned. Social values embedded in places of aggregation - such as streets and squares - are considered as important as the traditional aesthetic and historical values linked to built heritage. Moreover, the new values suggested by the participants enhance the established classifications supported by the AHD in legislation and policy (such as HE Conservation Principles 2008). For example, the definition of "luoghi per il gioco" (space of play) provided by workshop participants is a new class of value contextualised in the Amatrice case study. In addition, the classification of "luoghi per il gioco" presents an interesting concept that underlines the importance of the idea of "places in between". In the context of urban-spatial design, this term tends to refer to non-fixed and transitional places, which can be reused and reinterpreted (Piccinno and Lega 2019). This notion differs from the places where the urban and architectural fabric identifies their meaning and function (i.e. monuments and

landmarks) in a more static way. From this perspective, the map developed in Amatrice aims to support the sense of belonging during a crisis, where the social fabric of the community is more vulnerable and often fragmented.

In both cases the studies, using quantitative and qualitative data, the PGIS maps provide a unique interpretation of resilience at the building and individual levels. In the feedback received from the York map, there was an appreciation of the different layers of knowledge included in the legend. This combined, for the first time, official and unofficial sources of information related to flood events in York. Due to the aforementioned impact of COVID-19 on this research, it was not possible to gather feedback from the Amatrice stakeholders. However, the map of Amatrice is a unique example of post-disaster analysis. This is because it differs from the traditional anti-seismic mapping approach which are based on vulnerability and damage classification. Resilience, therefore, is a contingent concept, influenced by its surrounding social and architectonic landscape. This illustrates a specific aspect of resilience that is intimately connected to the context of a place. Finally, a link between the notions of resilience and 'locale' (Giddens 1990) is established, highlighting the importance of the social interactions and perceptions that shape and nurture the meaning of a space.

8.3.3 Limitations and alternatives of PGIS

Despite the stated advantages of the role of maps and community participation in describing resilience, this method presents some limitations regarding the representation of reality and interpretation of resilience. The methodology adopted in this thesis rejects positivistic mapping procedures by including interpretations and perceptions of groups of people and multiple types of knowledge. This position is aligned with the study of Heesen et al. (2014) who distrust the process of "spatialization" and "objectification" of social phenomena into a map. In their article, PGSI and collaborative mapping are suggested as alternative approaches that can integrate inductive and context-related interpretations of reality. However, they

argue that social issues transcend "geographical fixation" (Heessen et al. 2014, 77), as maps crystallize complex cultural conditions in a single time and point of view. To address the issue of temporality reducing the map to a "snapshot" of reality, I argue for periodical monitoring and upgrading of the map. This could be achieved through continuous communication between the community and local institutions. However, this raises some questions about data ownership, management and storage, and the technical ability required to implement the maps. As discussed in section 6.5.2, during the focus group in York, there were some suggestions related to the use of the map within cultural and governmental institutions to guarantee the future of the project:

> *"This [the interactive map] would be more useful if it was hosted from an organisation that maintains it for the future and gets continuous use. It's a very important thing. Otherwise it becomes somebody's PhD and nobody ever looks at It".*
>
> *(P1 Appendix 4, 4.5, 1)*
>
> *"I can see the state agencies using this map".*
>
> *(P2 Appendix 4, 4.5, 4)*

Based on the above feedback, it became apparent that one possibility is that public institutions could be responsible for managing and storing the data contained in the interactive map, providing the necessary technology infrastructure. Indeed, the GIS software and web application used in this study are private and institutionally owned. This requires a high level of expertise and access to technology to guarantee the sustainability of the project. However, this could raise tension due to perceptions about inequity of ownership / agency might come in institutional ownership of data that is constructed by public citizens. To address this issue, other methods of collecting geographic and qualitative information could be adopted by using open-source software. In academic literature, these methods are classified by Goodchild (2007, 212) as VGI (Volunteered Geographic Information), which implies the

engagement of citizens to develop web maps through crowdsourcing and large public participation. This represents a more user-centred alternative that allows a democratic sharing of information that can counter balance the technical expert's traditional role as a gatekeeper of knowledge.

Additionally, the use of most digital technologies, including PGIS, VGI or crowdsourcing, to promote community participation can highlight pre-existing social, gender and economic inequalities. Due to greater male participation in online mapping projects, a recent study on crowdsourced mapping and gender biases (Gardner et al. 2020) highlights the failure of VGI practices to represent the whole community's interests. The authors argue that this is influenced by cultural habits in terms of technology engagement, literacy and gender misconception that discourages women to participate in online projects. In consideration of these issues, predominant male participation has been recorded in the different research activities in both case studies. It is not within the scope of this research to determine the impact or cause of this disparity. However, at a cursory level, it may be related to the under-representation of women in the architectural and engineering industry. Indeed, a recent survey of the 100 biggest architecture firms carried out by Dezeen magazine revealed that women occupy just 10% of the highest-ranking jobs (Fairs 2017). Therefore, the disparity encountered in this study is related to the topic and specialist field of the area of the research rather than to the methods.

Thus, access to technology, requisite skills and representation are crucial limitations of PGIS projects. Indeed, the use of maps as a tool to improve risk awareness must consider issues related to visual accessibility and skill capability in map reading. Many people find maps difficult to interpret and use. Thus, efforts should be made to address map accessibility. An example of this is represented by the growing research within the GIS community in providing audio and tactile maps for visually impaired people (Maxwell 2015). In terms of social issues, Tipnis (2018) underlines issues of technology accessibility by providing an example of heritage protection in semi-urban and rural India. The author strongly argues that elitist

groups are often the first to adopt social media and digital tools which threatens the democratization of knowledge. She proposes an alternative combination of both digital and traditional media to develop projects in close contact with the local community.

Co-production, co-creation and co-design of heritage conservation tools are becoming a more popular approach to engage different citizen groups. These new methods are intimately connected to the notion of 'citizen science', which supports grass-roots knowledge and democratic understandings of heritage (Lewi and Smith 2016, 4). The MIT Open Documentary Lab offers an exhaustive definition of co-creation that highlights the relationship between the specialist and the community:

> Co-Creation offers alternatives to a single authored vision. It's a constellation of media methods and frameworks. Projects emerge out of process, and evolve from within communities and with people, rather than being made for or about them. Co-Creation also spans across disciplines, organizations and can also involve non-human systems. Co-Creation ethically reframes who creates, how, and why. Co-Creation interprets the world, seeks to change it, with a commitment to equity, and justice.
>
> (Co-Creation Studio na)

Thus, at the core of co-creation lies a community based and localised interpretation of heritage and its embedded value. In York, the project of 'My York Central' (https://myyorkcentral.org) is a significant current example of public engagement design and democratic participation. The project is characterised by a change in the collaborative endeavour in terms of early involvement of the community to set the agenda for the project. This is developed using an open-brief and ongoing conversation. In contrast with participatory methods, the involvement of the community in every phase of the project suggests a pluralistic and creative approach.

8.4 Tangible and intangible adaptation practices

The results of the PGIS and focus group analyses described above highlight that resilience is fundamentally a quality influenced by human and systemic factors, rather than inherent to the built environment. This concluding section describes the meaning of resilience as it emerged in the two case studies. It focuses on the role that resilience plays in the adaptation process through tangible and intangible practices. The distinction between tangible and intangible practices refers to aspects of local disaster culture used to face external natural threats, where intangible elements may also result in physical manifestations. The dichotomy between the two terms reflects the expanded concept of heritage which now includes intangible values, natural landscapes and living traditions (UNESCO 2003). This informs that, in addition to structural (tangible) strategies for tackling disasters, more attention needs to be paid to non-structural solutions (intangible) which comprise cultural practices and human behaviour. Central to this framework is the understanding of resilience drawn from this study. It should be noted that in terms of the recovery process the two case studies present different scenarios. While in York there was a prompt response to the disaster in terms of building adaptation and recovery after the flood of 2015, the process of rebuilding the historic centre is still underway in Amatrice. This difference led to the use of two different mapping methods to describe resilience. As discussed earlier, in York tangible elements of adaptation have been recorded, as well as the change in behaviours and risk perception of building users. In Amatrice, where the physical remains of the buildings are lost, the concept of resilience was associated with the recovery of the heritage value of the historic centre.

However, the analysis of the post-it activity (section 6.3, 7.3) of both case studies, highlights a similar dualistic meaning of resilience. Resilience is understood by the participants as a 'quality' of the building (i.e. resistance; tenacity) or as an 'action' that contributes to the process of adaptation (i.e. keep valuables safe, passport and photo in the plastic box; resilience is making new children'). In addition,

it can be argued that the understanding of resilience is bonded to different cultural dimensions such as religious beliefs and traditional practices. In the Amatrice case study, the group described the concept of resilience as a "reconstruction of the soul". This comment arguably derives from the predominance of Catholicism in Italy. Here, reconstruction relates to something intangible, spiritual, social and emotional as well as physical. This intangible connection with the place nurtures a sense of belonging and collective identity.

These dichotomous perspectives on resilience practices - quality and action - reflect the theoretical distinction made in chapter 2 between 'ecological' and 'engineering' resilience. This distinction is not mutually exclusive, and can be combined to provide a holistic response to disaster management and building adaptation. Indeed, in the case of the Merchant Adventurers Hall, physical adaptation and recovery measures have been implemented with half of the funding from insurance payouts (**P7** Appendix 4, 4.1,15). However, it became evident that the lack of intangible strategies such as the adoption of a risk museum plan was a critical factor that increased the vulnerability of the building to flooding events. In contrast, for private owners of terraced houses in the same area, the reliance on the Foss barrier for protection and the limited support from insurance companies has led to the use of 'like for like' interventions in their buildings. Although the data refer to the same area and risk exposure, it became clear that different adaptations are therefore also dictated by economic resources and institutional response.

In Amatrice, the group proposed solutions to improve future resilience by combining anti-seismic reconstruction systems (structural elements) with behavioural solutions that can improve the timing of the emergency response (see **P1**'s response in section 7.3). Resilience practices, both tangible and intangible, are influenced by some contingent circumstances which have been already described in the above discussion themes. Indeed, building on Giddens (1990) argument that a place is the result of local social interaction, I suggest that resilience can be understood in the same terms. It is a quality rooted in a specific time and place and

expressed mediated by local culture. From the comparative analysis of both case studies, the following elements that influenced the ability of resilience practices to develop within a certain context can be summarised as:

1. Type of natural disaster: frequency and severity of the damage
2. Relationship between the local and national institutions
3. Perception of heritage – significance and values
4. Community interest and attachment to local heritage

Firstly, the frequency of natural disasters and severity of the damage greatly influence risk awareness and perception and therefore the capacity to adapt. In York, location and exposure to flood events is central for the development of resilience measures. The 'build back better' narrative is fully realised in the new design of the Red Tower, including flexible solutions to improve the risk response in a resilient way. Here, community engagement and local and historical knowledge of the area and its embedded risk, has been pivotal for the success of the project. In Amatrice, the altered risk perception and the lack of a local seismic culture has exacerbated the severe damage to the physical fabric of historic buildings. Another element that can foster resilience practices is improving the relationship between citizens and local and national institutions. This applies both to development of resilience-oriented policies and guidelines, but also to improving risk communications in the before and after phases of the disaster event. Top-down decisions and community exclusion from the reconstruction process are the main issues that led to the fragmentation of the Amatrice community and their sense of 'estrangement'. In York, in line with UK policies on flood risk management, the EA and the local council have promoted initiatives for better cooperation with the community. The case study of the Red Tower Project underlines the essential role of institutional bodies, such as York City Council, to facilitate the development of resilience practices in which local groups can participate. The valorisation of heritage, in terms of its recognised significance and embedded values, is a crucial factor in achieving resilience. While in Amatrice the perception of lower status built

heritage -considered *minore*- has led to a reckless demolition of urban structures (Carbonara 2018; Gizzi 2018), in York, due to its historical and tourist value, the government has promptly invested in its recovery. However, also in York, only high-level listed buildings have been favoured and supported by heritage institutions and insurance companies for the adaptation process. Therefore, the perceived importance of heritage is intimately linked to institutional and governmental interest. Yet, the citizen-led activities described in chapter 5 are a clear example of how community collaboration can help save threatened heritage assets and raise public awareness. This factor is intertwined with the concept of agency and people's participation in their assets.

8.4.1 Resilience as a creative process for future heritage

This concluding section foregrounds the potential lines of future enquiry described in the next chapter. Recent heritage scholarship provides context to the following discussion of resilience. The introduction of the concept of resilience in heritage studies is closely associated with the notion of change and the evolution of values. Adaptation, on the other hand, is the way the process of change is realised. Social justice activist and black feminist Adrienne Maree Brown, uses the concept of 'intentional adaptation' to underline that change should be faced with intention in terms of "staying in touch with our deep purpose or longing" (Brown 2017, 70). Intention informs the collective vision for a strategic plan for the future. In the heritage sector, the concept of 'intentional adaptation' can be used to frame the decisions about change and the impact of future disasters on the historic environment. Nevertheless, this aligns with the principle of sustainable development of built heritage in terms of "controlling change and choosing directions that capitalize most effectively on the inheritance from the past" (Fairclough 2003, 24). External factors, such as climate change hazards, combined with social dynamics and participation, have broadened the scope of heritage, introducing the notion of change. Indeed, traditional views of heritage tend to emphasise the role of the past as static, focusing on historic and physical values. More recent scholarship has recognised that

heritage is part of a dynamic cultural process, undermining the notion of stability.

> A new view of heritage, serving society in times of rapid climate change, embraces loss, alternative forms of knowledge and uncertain futures. It draws on creativity for adaptive solutions and it will ensure that future generations are empowered to make decisions about values and the ways heritage assets are passed through time.
>
> (Harvey and Perry 2015, 3)

Themes of uncertainty and transformation have become predominant within current conservation debates. For example, the UCL 'Heritage for the Future' programme brings together international conservation practices that have considered these themes enacting unexpected realities. This academic contribution reframes the notion of heritage as 'processual', 'discursive' and oriented to the future (Harrison 2020). Drawing upon this research, Holtorf and Högberg (2021) point out the difference between present-centred and future-oriented perspective of heritage for social adaptation and development. They criticise the assumption that the same values conserved by heritage managers today can be the same shared by future generations, highlighting the changing relationship between nature and culture and its effects on heritage practices. Posing a question on how heritage professionals can be better prepared for the future, they suggest combined solutions of improving work activities and optimised decision-making processes that consider multiple scenarios of change that provide benefits to many groups. The association of resilience with creative adaptation practices undermines the notion of the stability of heritage that has dominated conservation theories during the last century. Natural or manmade crises represent a learning opportunity that requires memory-building of past events to self-organise and renew (Berkes 2007, 288-289). The relationship between disasters and new opportunity can be seen as a dimension of Rogers' theorisation of continuity and crisis (Rogers1957) in architecture, as discussed in chapter 3. Here, tradition has been identified as a bridging concept between past and future. The findings of Amatrice and York corroborate the idea that a

catastrophic event can represent a moment of reflection and improvement for better tangible and intangible adaptations. This study emphasizes that resilience thinking can guide the reconstruction process in a creative way (Berkes 2007), using elements of memory and tradition to build new meaning and forms of heritage adaptation. In order to live creatively and accept the uncertainty of our changing reality, Janowski and Ingold (2016) reconsiders the significance of imagination as a generative impulse:

> To imagine, we suggest, is not so much to conjure up images of a reality 'out there', whether virtual or actual, true or false, as to participate from within, through perception and action, in the very becoming of things.
>
> (Janowski and Ingold 2016, 3)

Imagination is therefore an element that connects the past, present and potential future through the mind of the perceiver. Perception and (participatory) action are two key concepts used in this research to describe the influence of resilience thinking on communities affected by sudden destruction or damage to their heritage. The creative combination of official and unofficial types of knowledge is a necessary strategy to promote public participation in the decision-making process and prevent the disintegration of the local community. Opening a discussion among local stakeholders and institutions as to which "intention" should guide change is one way to promote resilience. Brown (2017, 158), echoing the theories expressed in the Heritage future programme, argues that collaboration, at the human scale, is the process of implementing ideas that create a multitude of realities, thus "cocreating" the future.

8.5 Conclusion

'Resilience thinking' has challenged traditional practices of disaster risk management and conservation by "embracing change" (Holtorf 2018), promoting human agency and its capacity to adapt and manage different scenarios. This

paradigm shift has profoundly influenced the new conservation theories on heritage management that adopt a more holistic and multidisciplinary stance. The above comparative discussion has described how ‘resilience thinking’ and practice unfolds in the two historic centres and its impact on the management and conservation of built heritage. This study demonstrates a correlation between resilience, adaptation and heritage values. Due to the differences encountered in the two-case studies, resilience is understood as contextual to the socio-cultural and historical environment. No single definition of resilience is formulated, challenging the ambition to frame this concept in a unique way. Indeed, resilience embraces different meanings and values depending on different factors that influence its understanding. Resilience is seen as a process that can develop and take on contextual meaning depending on the response and culture of the community. These factors are related to the local disaster culture in terms of risk perception, awareness, preparedness and memory of past events. This research has shown that PGIS and collaborative mapping techniques have a processual value beyond their capacity of "describing" and "assessing" resilience. This methodological process in collaboration with local stakeholders can enhance resilience thinking and foster new debates about adaptation solutions. After discussing the three themes, the findings demonstrate that resilience is a "quality" or "action" that contributes to the adaptation process. The creative quality of "resilience thinking" is highlighted as a strategy to better prepare for an uncertain future reality. This implies effective communication and organization within local and national institutions as a resilience condition in the face of disasters. The following final chapter will discuss the research journey, highlighting the limitations and unanticipated obstacles as well as the positive outcomes. Finally, drawing upon the key findings discussed above, areas of future research are suggested.

9. Future strategies for building resilience amidst multi-dimensions of disaster realities

Chapter 9 is the final chapter of this thesis. It is structured in three sections contributing to a forward-looking debate on issues related to the concept of 'resilience thinking' as applied to cultural heritage at risk. Building from the new body of literature presented in section 8.4, parallels will be drawn between heritage and resilience as two contingent concepts, which are locally-specific but globally significant for sustainable communities. Moreover, the processual nature of these two concepts is emphasised, drawing attention to the process of change and adaptation offered in the wake of a (natural) crisis. ‘Uncertainty’ plays a crucial role in stimulating resilience practices that creatively adapt to different realities, using local traditions and knowledge to bring a dimension of continuity between the past and future.

> Inside the word "emergency" is "emerge"; from an emergency new things come forth. The old certainties are crumbling fast, but danger and possibility are sisters.
>
> (Solnit 2016, 65)

After summarising the key research themes, the first part of this chapter critically reviews the development of the study. The rationale behind the research transitions that took place in recent years is justified in terms of theoretical and methodological choices. Then, significant research contributions will be described, positioning them in broader and current conservation debates. These contributions reveal an understanding of resilience as it emerged from a specific cultural context and its

relationship to the local disaster culture. Additionally, practical recommendations are suggested for implementing resilience discourse into heritage practices, clarifying the positive potentialities for use of PGIS technologies. The last section proposes future lines of investigation in which this study could significantly contribute. Here, the current challenges posed by COVID-19 are taken as a prime example to reflect on the potential of resilience research in the context of multi-layered dimensions of disasters. New methods of public engagement and participation, such as co-production, are suggested to fulfil the aims of the proposed future research.

9.1 Reflection on the research journey

This research has investigated the multiple meanings of resilience in two real-life case studies, exploring the relationship between cultural heritage and the local community in areas exposed to natural hazards. The empirical findings have bridged a gap in the literature, shedding light on the practical applications of 'resilient thinking' in the field of conservation. The introductory chapters explore in depth the theoretical shift in DRM from the sole use of the vulnerability framework to adopting the alternative resilience perspective. The traditional notion of 'natural disaster' has been revisited, considering that extreme adverse conditions may instead be understood as part of the natural cycle and human experience (Jigyasu 2005). From this perspective, the concept of 'local disaster culture' was introduced in relation to resilience by providing an overview of culture-based approaches that emphasise the value of the traditional knowledge of learning to live with risk. The progressive transition towards adopting the resilience paradigm in everyday discourse represents a rupture with the technocratic tradition, laying the foundation for the development of novel multi-disciplinary approaches in different disciplines.

This paradigm shift raises questions about how the concept of resilience fits into the heritage discourse and, specifically, how it can be integrated into the recovery process of cultural heritage affected by sudden and severe damage. Chapter 3 articulates a response to this issue. Ruskin (Wheeler and Whiteley 1992,179-208) and Rogers's (1958) idea of tradition suggests its value as a vehicle

for continuity with the past towards the future. It establishes a strong connection between the plurality of heritage values, by 'managing change' for future generations (Manson 2006; Pereira 2007; De La Torre 2013) and ‘resilience thinking’ (Folke et al. 2010) which include the concepts of adaptation and social learning. This transition has led to greater inclusion of local stakeholders in the different phases of the conservation project, using social methods and participatory studies. For this reason, the methodological core of this study is based on an experimentation of qualitative research with traditional systems of spatial and geographical representation, in this case GIS.

Drawing on my architectural background, the starting point of my research was technically oriented. I initially became interested in the physical forms of architecture in which the building's adaptation process can be recognised. This has been defined in this thesis as a ‘tangible disaster culture’ (section 2.2). While deepening my knowledge on resilience, the interdependent relationship between cultural heritage and its social and cultural environment became evident. Giddens (1990) and Lefebvre’s (1991) conceptualisations of space and place underpin the extended and contemporary conception of heritage, including its intangible expressions. Indeed, historic fabric entangles with complex social dynamics and activity that provide meaning to space. This new human-centred conceptualisation of my research that this is an entirely new area for me, led to the experimentation of qualitative research combined with digital technologies. Accordingly, the scope of the original research question was expanded to include intangible aspects of disaster culture related to the human experience of disaster in terms of risk perception, changing behaviour and memory of past events. The choice to introduce the new case study of Amatrice during the second year of my PhD was taken to broaden the pursuit of resilient elements, where the physical expression of cultural heritage had been suddenly lost.

After conducting my initial fieldwork in York, tangible and intangible elements of local flood culture were recorded; nevertheless, they would have offered only a limited view on resilience had they been presented alone. The case of Amatrice was

an ideal choice to allow a comparative analysis for several reasons. Firstly, the two natural events happened in a proximate space of time, providing an excellent metric and scale for comparing the two cities' recovery process. Secondly, the different contexts invited a reflection on the meaning of resilient reconstruction comprising of different values and cultural expressions, beyond simply material aspects. Finally, my background, experience and interest in seismic areas and architecture facilitated this study's development, offering a comprehensive overview of applying resilience thinking to heritage sites. This took my research beyond the material context that has been at the heart of conservation theories and DRM approaches over the past century. On the contrary, advanced principles of heritage that move from a self-referential and closed position towards the inclusion of social, cultural, environmental issues, adopting a multidisciplinary perspective.

9.2 Research contributions to the understanding of resilience

In this section, the main contributions of this thesis are summarised, drawing on the previous discussion in chapter 8. The first notable contribution is the application of the theoretical concept of resilience to heritage settings. I initially adopted the notion of ecological resilience proposed by Holling (1973) as it emphasises the ability of a system to adapt and its 'bounce-forward' ability (Manyena 2015). Indeed, this definition of resilience is semantically close to the present narrative that considers heritage conservation as a dynamic and cultural process. This conceptual parallel was used to interrogate the adaptation process for cultural assets in two different historic centres. However, the findings challenged this first assumption raising critical issues concerning the application of resilience from the natural to the built environment. As discussed in section 8.2, while citizen agency and property ownership are crucial aspects for the development of 'resilience thinking', they depend on cooperation between national and local government bodies and experts to facilitate the recovery process.

Comparing the two citizen-led experiences - the Red Tower Project and the 'Comitato Civico 3e36'- has demonstrated that governmental and cultural

institutions influence the outcome of these activities both positively and negatively. Thus, the adaptive ecological cycle theorised by Holling (1973) translated into resilience practices in the built environment fails to account for the networks of people and organisations involved, and the power dynamics within decision-making processes. The assumption that 'built and cultural systems' work as a 'whole' ultimately depends upon the collaboration between all the stakeholders involved in adaptation and learning. Unless governments recognise bottom-up approaches and support community engagement, a sustained resilient outcome is unlikely to be attained. Moreover, the study suggests that developing participatory policies and activities is a way to obviate the fragmentation and sense of 'estrangement' experienced by people after a disaster event. While the ecological system embeds the quality of resilience in its self-reliance, it can be argued that the built environment responds to change depending on its users' actions.

Secondly, this study defines the complex meaning of resilience within built heritage from a qualitative and quantitative perspective. A first standpoint is that it is unrealistic to provide a single definition of resilience related to human, cultural and heritage systems. Overall, this study strengthens the idea that resilience is a multifaceted concept and contextual to its surrounding environment (Borie et al. 2019). In particular, the focus group discussion reveals a dualistic understanding of resilience - quality and action - that reflects the theoretical distinction between engineering resistance and adaptation. This duality is by no means contradictory as it considers the mechanical response of the physical structure that is designed to resist the shock caused by seismic or water action. However, the integration of structural and non-structural measures or approaches will foster positive outcomes, providing a holistic application of 'resilience thinking' in the heritage field. For this reason, this study analyses the factors that influence tangible and intangible resilience practices, considering the root dynamics that increase the adaptation response of the built environment. Risk perception, awareness and memory are crucial aspects that imbue the local disaster culture of a place. It became apparent that these concepts are an integral part of the heritage discourse as they shape the identity of a community in relation to natural hazards threats. Additionally, local

disaster culture supports local capabilities in facing natural hazards in terms of disaster preparedness. Therefore, the active role of heritage and community is emphasised through the integration of local disaster culture as a means of resilience.

In terms of a quantitative understanding of resilience, the York example offers an alternative framework to the traditional vulnerability assessment. This is an original contribution that enriches the debate on measuring resilience using indicators at the building scale. The experimental assessment, performed in the Fossgate area of York, indicates that vulnerability and resilience are distinct paradigms. Indeed, the Merchant Adventurers' Hall analysis shows that the building can be considered highly vulnerable and yet be extraordinarily resilient and prepared to cope with future flooding. Thus, building resilience does not necessarily mean decreasing the vulnerabilities of a place but that the risk from vulnerabilities is reduced. This outcome is contrary to previous studies that have suggested that vulnerability and resilience are opposite poles of the same system (Manyena 2006, 440-441). From this standpoint, a resilience assessment is suggested in combination with an analysis of the vulnerable aspects of built heritage. This combined analysis will provide a more holistic representation of the historic environment, informing the decision-making process to prioritise resources and expertise. However, this resilience assessment method is necessarily limited to cases where the hazards have not destroyed the physical evidence of the building. Indeed, it relies on analysing the quantitative and qualitative sources of data and the ability to access the building. The concluding discussion in chapter 8 frames how the notion of resilience emerges from the findings, fitting it within the broader context of heritage by adopting a future-oriented perspective. Resilience is considered a creative process, in which traditional techniques and experience inform new ways of adapting to a risk environment. This conceptualisation of resilience can be used to develop a collaborative partnership between organisations and citizens, improving the local response to disasters.

Finally, the research contributes to integrating social sciences with geospatial information technologies, challenging the traditional role of maps for presenting

quantitative information and representing static realities. The PGIS and collaborative mapping methods adopted in this thesis have shown that it is possible to "describe" and "assess" the different resilience dimensions encountered in the two historical centres. This is done by developing a specific understanding of how the notion of resilience applies in a consideration of the building's scale and its intangible aspects. The two interactive maps contain different sets of information that describe the historic centres' adaptation and values in relation to their recovery processes. In York, the combination of spatial features with qualitative information demonstrates that resilient practice is intimately connected to the geographical location of the building analysed. The resulting map of Amatrice underlines the relevance of including the community's heritage values for future reconstruction. Participants supported an "authentic" rather than "identical" reconstruction, where the concept of authenticity is associated with the respect of traditional values to which the community can relate. Hence, a different understanding of resilience connected to the territory and local needs is presented.

From a technological perspective, the use of online interactive maps to represent a different interpretation of realities is an effective method of sharing real-time information to a broader audience. The user is able to personalise the map through the ArcGIS platform and use it to support a clear and transparent communication with other stakeholders. While we all face the consequences of the current COVID-19 pandemic, digital technologies provide crucial support in creating online platforms for communicating and connecting remotely. Considering this issue, the maps for York and Amatrice could inform online strategies for social learning and stakeholder discussion throughout the pandemic. Notwithstanding the limitations of the mapping methods described in the previous chapter, such as access to technology, requisite skills and accessible representation, maps are an ideal tool to support dialogue within the community and with governmental institutions. Indeed, it is possible to represent abstract concepts in terms of risk perception, preparedness and heritage values that provide a picture of people's thoughts and emotional responses which are often excluded from the decision-making process. Thus, participatory methods combined with digital spatial features

provide access to different sources of information. This use of PGIS nurtures the idea of space as a product of social interaction, including tangible and intangible expressions of the local disaster culture.

9.3 The multi-dimensionality of disasters from the resilience perspective

'Uncertainty' is increasingly considered an intrinsic aspect of our reality. In the last year, the precarious nature of all aspects of our society has been highlighted by the COVID-19 virus. Questions around unsustainable environmental practices and economic inequalities that characterise our way of living have become prominent in public discourse. Fluck (2020) powerfully articulates the clear connection between the climate crisis and the global pandemic "being a result of an unbalanced relationship with nature". Indeed, as for the concept of 'natural disasters' discussed in section 1.1, according to indigenous people in Guatemala, the pandemic is not a disease. Rather, it is a product of "an imbalance that we ourselves have promoted, [just as] natural disasters do not exist, it is us who create them" (ICCROM 2020).

The current pandemic amplifies (and was arguably exacerbated by) pre-existing vulnerabilities in terms of social, economic, political and cultural factors. Due to this, some governments are now attempting to respond to myriad related emergencies, such as rising unemployment and social inequity and poor educational outcomes. This dynamic reveals the multi-dimensionality of disasters that affect different parts of the world including historic centres considered at risk of natural hazards. In this thesis, the of multi-dimensional concept of disasters is used to express the complex layers of vulnerability that affect a community facing various disasters. For example, the coronavirus pandemic in Amatrice caused further delays to the start of the reconstruction process. This has exacerbated pre-existing feelings of isolation within the community, that are accentuated and defined by an Italian journalist as *"L'isolamento nell'isolamento"* translated as "The isolation within the isolation"(Di Vito 2020). On this basis, the promotion of resilience studies and their application to the historic environment is crucial for developing innovative strategies within the heritage sector. This need was addressed in this research by analysing

the understanding of resilience in two case studies, which embody the potential of using tangible and intangible practices to respond to external risks. The findings show that the methodology proposed is flexible and can be applied in different contexts. However, the scope of this study was focused on the analysis of two specific natural hazards, disregarding the complexity of the multi-faceted nature of disasters and their future impacts.

A natural progression of this work would be to analyse the resilience of heritage settings considering the effects of multiple disasters and underlying vulnerabilities. The role of resilience and local disaster culture is becoming even more prominent during these challenging times. In future, similar research could be undertaken to look beyond just natural hazards. It could be useful to analyse how the impacts of various disasters, including pandemics, affect the resilience response and the recovery process of heritage sites. New research may explore the varied uses and understandings of heritage in the post-pandemic phase. International cultural bodies are currently engaged in several discussions on the challenges encountered by cultural heritage amidst the COVID-19 pandemic and new opportunities for change (UNESCO 2020a; ICCROM 2020). Returning to a 'new normal' implies creatively imagining different coping strategies and measures to assist the adaptation process. Thus, new research should aim to respond to urgent issues of accessibility, interpretation and monitoring of heritage sites and museums. Central to this is the notion of resilience applied to cultural heritage that has been damaged by extreme natural events.

Post-disaster adaptation and community engagement could be analysed by adopting a multiple risk-factor paradigm rather than a unidimensional focus. During the ongoing pandemic, in the short and medium-term at least, we have seen behavioural and structural adaptation measures that are tailored to meet the new requirements of social distancing, hygiene, and isolation. These may, unfortunately, become long-term post-disaster considerations in heritage management. While considering the multiple dimensions of disasters, the concepts of risk perception and awareness within a community relies on the severity of their effects. This can alter

the intervention decision-making process in terms of prioritisation. For example, the World Heritage Site Manager of the Ancient City of Aleppo reported that while coping with the COVID-19 pandemic, the old city still suffers from the severe war damage that has dismantled the physical and social fabric of the city in terms of the social and institutional relationship (UNESCO 2020b). The combination of multiple crises has inevitably delayed the reconstruction process in the old Syrian city. Simultaneously, the effects of numerous disasters can expose built heritage sites to increasing risks, such as looting. The lockdown measures have threatened the safety of the archaeological site of Bagan, Myanmar, raising international concerns about the conservation of the Buddhist temples (Kenney 2021). Thus, a fruitful and timely field for further research would be exploring the potential of resilience thinking to understand the multi-dimensions of disaster impacts.

This study vigorously supports the crucial role of mapping in bringing together different sources of knowledge and sharing it with various stakeholders. During the current crisis, heritage organisations and museums (see NEMO 2021) have produced numerous online maps to provide a virtual experience of various world heritage sites and to support digital activities promoted by museums during the COVID-19 pandemic. However, the implementation of these maps makes very limited use of the potential for participatory approaches such as co-production, co-creation and co-design. Further research could usefully explore how digital technologies, such as PGIS, could empower and support the local community in becoming part of the decision-making debate with the governmental bodies and cultural institutions. The present research was limited to the development of two interactive maps, exploring the functionality and potential of PGIS, but a logical progression from this would be a focus on the process of co-creation of digital material with the community and how such resources can be supported and sustained or archived. Moreover, the discussion has highlighted the challenges of the methodology in terms of time limitations and participant recruitment. Online and crowdsourced methods such as OpenStreetMap (OSM) and Volunteered Geographic Information (VGI) could be explored to effectively address the issues encountered in this study.

Finally, contemporary heritage studies (Harrison 2020; Holtorf and Högberg 2021) and policies (Cameron 2020) clearly show a trajectory towards a more social and democratic dimension of heritage in which the dominant power of expert authority is challenged. The nature of heritage has evolved, including new perspectives and intangible forms. Similarly, the response and management of disaster require a more holistic approach where the community's values and need are central. From this perspective, participatory and collaborative mapping methods are a valuable instrument to bridge the gap between the 'authorised discourses' and the multiple voices and interests of local stakeholders reflecting the social turn in the heritage field. Regarding PGIS, the researcher' role is as a mediator between the subjective reality of the participants and the technical aspects of the methods used. However, this role could productively foster a more co-creative research plan involving the community at an earlier phase to frame the research questions and objectives together. This process will engage the community directly in negotiating, agreeing collaboratively, and stating their needs and priorities to, local and national institutions.

Therefore, future applications of PGIS could represent the multi-dimensions of disasters' impacts to heritage settings and multi-hazard risk management, for example, amidst COVID-19 restrictions. The processual nature of collaborative mapping opens a window on fertile ground for new ideas, bringing confidence to the group that actively participates in the search for alternative solutions to external threats. Using the resilience paradigm suggested in this research, co-creation methods could be employed for understanding the dynamics of recovery in community and heritage sites that have been affected by multi-dimensions of disaster. Such methods can speak powerfully to an inclusive, creative process for future adaptations, reflecting social change in both the fields of heritage and DRM. Therefore, this research demonstrates the need for local or national governments to implement participatory activities which include different stakeholders to guide future priorities and/or investments in historic centres affected by natural hazards. This will promote the inclusion of different voices and perspectives into the design

and implementation process, raising awareness and the sense of agency within the community involved. Arundhati Roy, the Indian author and activist, echoes the opening quote of this chapter (Solnit 2016). She argues that emergencies such as the current pandemic are a 'portal' between different realities that offer an opportunity for change and improvement (Roy 2020, 214). Similarly, co-productive methods applied in the management of heritage exposed to external risk offer a space for creative solutions in line with the values and traditions of the stakeholders.

> What lies ahead?
>
> Reimagining the world. Only that.
>
> (Roy 2020, 6)

Appendix

Due to the size and varying material content, the Appendices are submitted separately in another document.

Abbreviations

CCA– City Council of Amatrice

CIC– Community Interest Company

CMA– Company of Merchant Adventurers of the City of York

CYC– City of York Council

DEFRA– Department for Environment, Food and Rural Affairs

D.M. dei L.L. P.P.– Decreto Ministeriale dei Lavori Pubblici

DRM– Disaster Risk Management

EA– Environment Agency

FWMA– Flood and Water Management Act 2010

GIS– Geographic Information System

GCI– Getty Conservation Institute

HFA– Hyogo Framework for Action 2005 - 2015

HER– Historic Environment Record

ICOMOS– International Council on Monuments and Sites

ICCROM– The International Centre for the Study of the Preservation and Restoration of Cultural Property

ICH– Intangible Cultural Heritage

INGV– Istituto Nazionale di Geofisica e Vulcanologia

LA– Local Authority

LLFA– Lead Local Flood Authority

MiBACT– Ministry of Cultural Heritage and Activities of Rome

OPCM– *Ordinanza del presidente del Consiglio dei ministri*

OSM– OpenStreetMap

PGIS– Participatory Geographic System

SFRA– Strategic Flood Risk Assessment

UN– United Nation

UNISDR– United Nation International Strategy for Disaster Reduction

UNESCO– The United Nations Educational, Scientific and Cultural

Organization

TCV– The Conservation Volunteers

VGI– Volunteered Geographic Information

YCT– York Civic Trust

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