EARTHQUAKE RISK PERCEPTION, COMMUNICATION AND MITIGATION STRATEGIES ACROSS EUROPE

Piero Farabollini, Francesca Romana Lugeri, Silvia Mugnano Editors











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Editors





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12. Assessing Resilience of Mountain Communities Hit by the Central Italy Earthquakes of 2016

Teresa Carone¹, Giulio Burattini², Fausto Marincioni³

Abstract

Community resilience is "the ability of a system to recover from the effect of a hazard, preserving its essential structures and functions". Psychological aspects have a significant influence on the adaptive capacity of populations hit by natural disasters. Among such aspects, place attachment appears to play an important role.

The well-being deriving from the identification with a place has been acknowledged in literature; the loss of one's own place has devastating effects on the emotional state of individuals.

Studies about natural disasters have largely underlined how such events change the emotional bonds with the territory, but only recently place attachment has been explored as a crucial aspect for maintaining the communities' resilience; most of the papers concerned climate change resilience, very few earthquake resilience.

This chapter aims to contribute to the understanding of the influence of territorial bonds on the social resilience of communities hit by earthquakes.

Data were collected through paper questionnaires, in three small mountain communities of central Italy, about one year after the earthquake of August 24th, 2016. Results show that place attachment was a central value for the three-quarters of the interviewees, despite the seismic hazard, in all three areas.

Findings encourage further investigations in other areas with different territorial settings and urban size, for a better knowledge of the role of place attachment for earthquake resilience.

¹ Università Politecnica delle Marche – Dipartimento di Scienze della Vita e dell'Ambiente, Via Brecce Bianche, SNC, Ancona (AN), Italy, e-mail: m.t.carone@staff.univpm.it.

² Università Politecnica delle Marche – Dipartimento di Scienze della Vita e dell'Ambiente, Via Brecce Bianche, SNC, Ancona (AN), Italy, e-mail: giulio.burattini.22@alice.it.

³ Corresponding Author; Università Politecnica delle Marche – Dipartimento di Scienze della Vita e dell'Ambiente, Via Brecce Bianche, SNC, Ancona (AN), Italy, e-mail: f.marincioni@univpm.it.

Keywords: community resilience, earthquake, place attachment, Italy, Marche region.

Introduction

Between August 24th and October 30th, 2016, a series of exceptional earthquake events took place in the middle part of the Italian peninsula; it was also the strongest seismic sequence in Italy in the last 35 years. The peak shock was recorded on the morning of October 30th with a 6.5 MW (Moment Magnitude of the earthquake, as defined by the United States Geological Survey, www.earthquake.usgs.gov), and its epicenter was near the municipality of Norcia. Such a seismic sequence affected an area of nearly 8,000 square kilometers, and for this reason it is considered the greater natural disaster in Italy over the past decades. The event affected 140 municipalities distributed in 10 provinces and four regions, mostly located at altitudes exceeding 900 meters and with a population generally comprised between 1,000 and 10,000 inhabitants.

The earthquake caused extensive damages to buildings; then, because of the inaccessibility of their homes, most of the residents have been moved to accommodation facilities such as campsites, apartments, Bed-and-Breakfast, or holiday farms. All these facilities are located along the Marche coastline or in areas far from their original territories and with a different landscape compared to their mountains of origin.

These people faced a real diaspora from their territories and had to deal with the disintegration of local communities, which negatively influenced their psychological well-being.

Psychological aspects deriving from the loss of one's place have a significant influence on the adaptive capacity of populations affected by natural disasters, with consequent effects on their resilience.

Resilience, indeed, 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, 2009).

Place attachment is an emotional bond, which is not necessarily linked to the relationships with local people (Altman and Low, 1992; Manzo and Perkins, 2006), it exists independently from the sense of belonging to, or integration with, the local community and is expressed through an intense connection to a specific territory.

Such emotional bonds with the territory are more important in small communities, with an economy primarily linked to the territory, compared to larger communities (Verbrugge and van den Born, 2018).

Literature about natural disasters has widely underlined how these events change the emotional bonds with the territory (Reser et al., 2011; Baylan et al., 2018; Verbrugge and van den Born, 2018), but only recently place attachment has been explored as a crucial aspect for maintaining the communities' resilience (e.g. Hulme, 2008; Zwiers et al., 2016; Guo et al., 2018; Bark and Sutherland, 2019; Dannenberg et al., 2019; Haney, 2019; Khanian et al., 2019; Lemée et al., 2019).

Nevertheless, most of the studies concern climate change resilience, and only a few studies approach the influence of place attachment on resilience to earthquakes (see, e.g., Clemente and Salvati, 2017).

The present chapter aims to contribute to the understanding of the influence of territorial bonds on the perceived social resilience of communities hit by earthquakes.

Specifically, the analysis was carried out in three small mountain communities (Visso, Ussita, Castelsantangelosul Nera), located in the Marche region (Italy), hit by the central Italy earthquake, which took place in August 24th, 2016, and affected the regions of Abruzzo, Lazio, Marche, and Umbria.

1. Theoretical framework

Place attachment is closely linked to the sense of community (Tartaglia, 2006). This concept indicates an emotional connection to the territory, which differs from interpersonal relationships with the specific people who live in the same territory (Altman and Low, 1992; Brown and Perkins, 1992; Manzo and Perkins, 2006).

Human beings have always felt the need for private space to defend themselves from the weather and to safeguard the privacy of family affections; from this innate need for security, protection, and confidentiality, the need for a personal home was born (Eibl-Eibesfeld, 2007).

The identification with the landscape as a service for the cultural ecosystem and its relationship with human well-being have been recognized by the Millennium Ecosystem Assessment [MA] (2005). Moreover,

landscape definitions include not only objective natural characteristics subjective human 1989). but also visions. (Turner. perceptions. identifications, and memories (Knez, 2006; Knez and Thorsson, 2008; Lewicka, 2008; Stobbelaar and Pedroli, 2011; Knez and Eliasson, 2017). This because people develop a sense of attachment not only physically and spatially, but also through psychological, social, historical, religious, moral, health and cultural parameters (Graumann, 2002; Knez, 2005, 2013, 2016; Knez et al., 2009; Knez et al., 2013; Lachowycz and Jones, 2013; Gunnarsson et al., 2016; Ode Sang et al., 2016; Knez and Eliasson, 2017). We anchor our existence to physical places, meaning that places serve to "situate the parts of our past life" (Casey, 2000).

Therefore, the identification with places (Stobbelaar and Pedroli, 2011) contains both cognitive and emotional processes (Knez, 2014), and this special bond is defined by Rubinstein (1992) as "a set of feelings that refer to a geographical place, which bind a person emotionally to this place according to his role or as an experiential setting ".

According to what expressed so far, many studies suggest that human health and well-being benefit from the natural environment (Lachowycz and Jones, 2013; Bratman et al., 2015).

Studies underlined the adverse effects of the displacement from one's own territory with the creation of various gradations of nostalgia effects, a desire to return home, depression, anxiety, and a sense of insecurity (Costa, 2010); this means that, in the event of a break in the link with the landscape, the identity of the individual may also be threatened and altered. Knez (2014) underlines that these feelings are particularly intense for mountaineer people that show very strong feelings of attachment and affinity to the mountainous territories.

Therefore, it is understandable that a strong place attachment becomes an essential factor for the resilience of a community and then for its return to be functional following an extreme event. To assess the perceived resilience of social communities, it becomes necessary to contemplate the relationship between landscape and human society, being these latter pivotal components of the reference system (Brown et al., 2019).

2. Methods

2.1. Study area

This chapter discusses the results of a specific portion of a broader project on earthquake resilience, which was carried out in the Marche Region, in the municipalities of Visso, Ussita and Castelsantangelo sul Nera (Province of Macerata) (Figure 1); territories strongly affected by the seismic events of August 24th and October 26-30,2016. The three selected towns are quite representative of the typical small cities of a mountain environment in Central Italy, with a low population density (Table 1), and a local economy devoted to agriculture, livestock, and forestry, as well as summer and winter tourism.

City	Visso	Ussita	Castelsantangelo sul Nera
N. Inhabitants	1062	419	260
Surface (Kmq)	100,41	55,3	70,67
Population density	10,6	7,6	3,7

Table 1 - *Demographic data of the three studied cities*. Source: https://ugeo.urbistat.com.

2.2. Data collection

Data collection was carried out approximately a year after the seismic events, in October and November 2017, through the distribution of paper questionnaires to the resident population, both to individuals remained in the cities and to the individuals moved to other locations.

The data collection aimed to sample a percentage of the total population of each studied city comprised between the 10% and the 20%, by using the per-quota non-probabilistic sampling method; a total of 240 questionnaires was obtained (Visso: 120; Ussita: 82; Castelsantangelo sul Nera: 38).

The questionnaire consists of 21 questions (Table 2), with different typologies of answer:

- Single choice;
- Multiple choice;

• Likert scale, with which the interviewed are asked to indicate how much agree with a particular statement (Strongly disagree, Disagree, Uncertain, Agree, Strongly agree);

- Intensity scale (not at all a little a medium enough a lot);
- Free answer.

1. In your experience, who needed most care in the aftermath of the earthquake?

2. Friends and acquaintances were important to face practical problems after the earthquake.

3. Friends and acquaintances were important to face psychological problems after the earthquake.

4. The earthquake strengthened the friendship in your community?

5. The predisposition to bond with other people was useful after the earthquake?

6. How important was participating in associations and events of your community?

7. What were the major difficulties during this emergency period?

8. Post-earthquake reconstruction what kind of typology should respect?

9. What priorities should guide the post-earthquake reconstruction?

10. What do you consider to be the most effective means of communicating information on a state of emergency?

11. Do you trust communication media?

12. Who would you contact for information?

13. In your opinion, the distribution of information on the risks of the territory is a duty only for the institutions or also for the citizen?

14. If you were displaced elsewhere, what were your most important feelings?

15. If you remained where you lived, what was most important?

16. Your home in what conditions it is, now?

17. Where is positioned your home compared to the city center?

18. After this experience, would you return to live in a non-seismic home?

19. Would it be wiser go living elsewhere?

20. Would you be prepared to take out an insurance policy for your home against earthquakes and natural events in general, in order to continue living in your territory?

21. Could the revival and reconstruction of the community start with the development of a participated emergency plan?

 Table 2 - List of the questions of the questionnaire. Source: authors.



Figure 1 - Municipalities involved in the study and affected by the seismic sequence of 24th August and 26-30 October 2016. Source: authors.

The questions can be grouped into a general part, including the personal information of the people interviewed, and a specific part addressing the topic of the study.

The questions composing the specific part of the questionnaires interest the following themes:

1. *sense of community* – investigating the predisposition of people to help others, to be helped by others, and to make friends;

2. *information and communication* – exploring how much the individual has an interest to participate in the community life and to be an active part of it;

3. *place attachment* – assessing residents' attachment to their territory and how much they wish to remain despite the high level of seismic hazard;

4. *community competence and risk perception* – evaluating individuals' ability to survive and adapt following the earthquake disaster.

3. Results

The sample is mostly represented by individuals under the age of 65 years, with percentages very similar for the three studied areas (more or less 85% for all the three areas) (Table 3); genders are well balanced in the cities of Visso and Ussita, and there is a predominance of the male gender in the city of Castelsantangelo sul Nera (42,1 % of female gender, compared to the 46,7% of Visso and the 50% of Ussita (Table 4).

City	Visco	Uccito	Castalsantangala sul Nara	тот
Age groups	v 1880	Ussita	Castelsantangelo sui Nela	101
< 65 years old	87,5	85,4	86,8	86,7
> 65 years old	12,5	14,6	13,2	13,3

City	Visco	Ussite	Castalaantangala sul Nara	тот
Gender	V 1880	Ussita	Castersantangelo sur Nera	101
Male	53,3	50	57,9	52,9
Female	46,7	50	42,1	47,1

Table 3 - Age distribution in the studied sample. Source: authors.

Table 4 - Gender distribution in the studied sample. Source: authors.

This chapter illustrates the results from the questions that can provide information about *place attachment*; specifically, we discuss the results

from the questions listed in Table 2 with the numbers 2, 3, 6, 9, 14, and 19.

Three of the questions address the aspects related to the social relationships of the respondents in their communities (questions 2, 3, and 6); the other three questions explore the importance given to the territory (questions 9, 14, and 19).

For the respondents, social relationships with individuals of their community are considered crucial in the aftermath of the earthquake event: more than half of the sample in all the three communities *Completely agree* or *Agree* whit the statement that friends and acquaintances were important after the earthquake.

The same result is given both from a practical and psychological point of view (Figure 2, Figure 3).

The significance given by the interviewees to the possibility of participating in the social life of their cities confirms the pivotal role of the community (Figure 4).

Indeed, in all the three studied areas almost the three-quarter of the sample declare that this aspect is essential; the amount of the answers *Completely agree* and *Agree* together reach a total of 71% in Visso, 71% in Ussita, and 69% in Castelsantangelo sul Nera.



Friends and acquaintances were important to face practical problems after the earthquake?								
Completely agree	Agree	Uncertain	Disagree	Completely disagree				

Figure 2 - Importance of relationships from a practical perspective (Question 2 of the questionnaire). Source: authors.



Friends and acquaintances were important to face psychological problems after the earthquake?								
Completely agree	Agree	Uncertain	Disagree	Completely disagree				

Figure 3 - Importance of relationships from a psychological perspective (Question 3 of the questionnaire). Source: authors.



Figure 4 - Participation in the social life of the community (Question 6 of the questionnaire). Source: authors.

About the priorities that should guide the reconstruction strategies, it is interesting to notice that even if the desire to have back the own home is important, it does not reach 40% of respondents in any of the locations. Indeed, the other 60% consider crucial the reconstruction of buildings for work and the social life of the community (Figure 5).

According to the answers provided in Figure 5, the respondents communicate similar nostalgia for their territory to the nostalgia for their homes. This nostalgia for the territory tends to be more important in the smallest community (Castelsantangelo sul Nera). Indeed, *I missed my house*, and *I missed my territory* show 26% and 23%, respectively, in Visso, 24% and 29% in Ussita, 32%, and 23% in Castelsantangelo sul Nera (Figure 6).

The last question analyzed here asks to the interviewed if they think it could be wiser to go living elsewhere given the unavoidable risk of their territory. As Figure 7 clearly shows, most of the people would prefer to continue living in their territory, despite the hazard and risks characterizing the area, with percentages that reach almost the three-quarter of the sample in all the three cities.



Figure 5 - Priorities of reconstruction (Question 9 of the questionnaire). Source: authors.

For this question, the parental role can represent a significant variable, since a parent should wish more security for its children. Notwithstanding, parents confirm the desire to continue living in their territory with very high percentages in Visso (81,6%), quite high percentages in Ussita (61,1%), and for half of the sample in Castelsantangelo sul Nera (50%) (Table 5).



Figure 6 - Feelings of displaced people (Question 14 of the questionnaire). Source: authors.

For the same question, gender differences did not give different results (Table 6). In Visso e Ussita *Male* and *Female* have similar answer, with about three quarters of the sample that wish to continue living in the same territory; only in Castelsantangelo sul Nera *Female* show higher percentages compared to the other cities regarding the possibility to move away because of the safety of their children (12,5%) or family (12,5%) and the worry for the dangerousness of the territory (18,8%).



Would it be wiser go living elsewhere?									
No, I would prefer to continue living here	Yes, it would be safer for my family	Yes, it would be safer for my children	Yes, living here is too dangerous	Other					
No Answer									

Figure 7 - Predisposition of interviewed to permanently leave the place because of the earthquake (Question 19 of the questionnaire). Source: authors.

City	Visso		Ussita	ı	Castelsantan gelo sul Nera	
Parental role	Р	NP	Р	NP	Р	NP
No, I would prefer to continue living here	81,6	67,9	61,1	80	50	75
Yes, it would be safer for my family	2	3,7	16,7	3,6	30	7,1
Yes, it would be safer for my children	4,1	4,9	5,6	1,8	20	3,6
Yes, living here is too dangerous	8,2	7,4	5,6	-	-	10, 7
Other	4,1	8,6	5,6	10,9	-	3,6
No answer	-	7,4	5,6	3,6	-	-

Table 5 - Parental perspective (P = Parents, NP = Non Parents) about the predisposition of interviewed to permanently leave the place because of the earthquake (Question 19 of the questionnaire). Source: authors.

City	Vis	SO	Ussita		Castelsantangel o sul Nera	
Gender	М	F	М	F	М	F
No, I would prefer to continue living here	73,9	72,1	70,5	74,5	86,4	43,8
Yes, it would be safer for my family	2,9	3,3	6,8	10,6	9,1	18,8
Yes, it would be safer for my children	4,3	4,9	4,5	2,1	4,5	12,5
Yes, living here is too dangerous	7,2	8,2	2,3	2,1	-	18,8
Other	7,2	6,6	9,1	8,5	-	6,3
No answer	4,3	4,9	6,8	2,1	-	-

Table 6: Gender differences about the predisposition of interviewed to permanently leave the place because of the earthquake (Question 19 of the questionnaire). Source: authors.

4. Discussion and conclusions

Resilience to disasters is a central issue in these last decades; this ability is profoundly affected also by psychological aspects influencing the wellbeing of the individuals involved in natural disasters.

Since the crucial role of place attachment in maintining the communities's resilience to earthquakes remain less explored, this chapter wants to contribute to a better understanding of this specific link.

Data were collected in three small mountain communities of central Italy, hit by the earthquake of August 24th, 2016, through the use of paper questionnaires.

Results highlight an essential link between the interviewed individuals and their mountainous territories and communities; such a link was not weakened by the occurrence of the dramatic seismic event they experienced.

The majority of respondents from all the three communities would continue to live in their places, despite the seismic hazard and risks. Worth of notice is the irrelevant differences between parents and non-parents in the choice to remain, underlining their desire, as parents, to grow their children in a place that represents the family roots and genius loci (Knez, 2005; Knez and Eliasson, 2017).

Such an aspect is visible only as a gender difference in one of the three areas (Castelsantangelo sul Nera), where women were more inclined to move away, compared to men, because of their family or children.

The displacement from the territory, even a temporary one, is lived by the interviewed with enormous sadness. This powerful emotional link to the territory is corroborated by the fact that the interviewed reported missing more the place than their homes or the manufacturing, albeit also these elements are considered necessary.

Findings, then, suggest that place attachment should be considered a crucial element also for the maintaining of earthquake resilience. This aspect is especially true for planning strategies, as recently underlined by studies concerning climate change resilience (Haney, 2019, and reference therein), since displacement of populations is often a mandatory management measure.

Findings encourage further investigations in other areas with different territorial settings and urban size, for a better understanding of the role of place attachment for earthquake resilience.

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Increasingly, socio-natural risks and disasters represent the result of an unsustainable interaction between human beings and environment. The current scientific debate has generally agreed on the idea that the impact of natural hazards needs to take into account the social vulnerabilities and exposures to risk of the affected population. The most recent earthquakes have unequivocally shown the complexity of the phenomena and their multi-scale dynamics. Indeed, the territory is the combination of natural, social and cultural environment and only by exploring its anatomy and physiology, it will be possible to manage and protect it in the best way.

This volume collects a quite wider range of national and international case studies, which investigate how socio-natural risks are perceived and communicated and which strategies the different communities are implementing to mitigate the seismic risk. This publication has been possible thanks to a fruitful discussion that some scholars had at the 36th General Assembly of the European Seismological Commission held in Malta from 2 to 7 September 2018.

Piero Farabollini, Ph.D. in Geomorphology (University of Perugia, Italy). He is Associate Professor of Geomorphology and Physical Geography at the University of Camerino (Italy), Earth Sciences Department and Coordinator of geological and geothematic field mapping and hydrogeological risk assessment projects. Previously he was coordinator of the Communication group of the National Council of Geologists and subsequently President of the Marche Association of Geologists. Currently he is Extraordinary Commissioner for Reconstruction after the Earthquake in Central Italy.

Francesca Romana Lugeri, geologist, sociologist, geographer (Sapienza University, Rome, Italy); Ph.D. in Environmental Sciences and Public Health (University of Camerino, Italy), she is researcher at ISPRA Institute for Environmental Protection and Research. Since 2016 she is Research Associate at the University of Camerino. Topics of current research projects are: unconventional scientific communication, dissemination, education; science popularization for risk consciousness and prevention; landscape analysis, geological and geothematic mapping, GIS developing.

Silvia Mugnano is Associate Professor of Urban Sociology and her research interests include housing, urban transformation, and socio-natural disaster studies. She is teaching nationally and internationally on tourism and local development, and she is intensively working on promoting the topic of socio-natural disasters in the sociological debate. Her recent publications on the topic include Territori Vulnerabili (FrancoAngeli, Milan, 2017) and a Special Issue on "Socio-Natural Disaster, resilience and vulnerability: the territorial perspective in Italian current debate" in Sociologia Urbana e Rurale (2016) and several articles among which "A New Normality for Residents and Tourists: How Can a Disaster Become a Tourist Resource?" (Springer, 2016).





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