RESEARCH ARTICLE

VOLCANICA

Understanding Attachment to Place in the context of the 2021 Tajogaite eruption crisis and recovery, La Palma

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Abstract

Previous research on place attachment in disaster contexts has focused on its influence on risk perception, evacuation, relocation, and its re-establishment post-disaster. However, consideration of place attachment in risk management has hitherto been little studied. The 2021 eruption of Volcán de Tajogaite, La Palma, significantly damaged urban areas and some residents still wait to be rehoused or allowed to return to their homes. Here we show that: (i) place attachment, particularly to the home, was largely neglected during the emergency yet strongly influenced resident experiences, and (ii) attachment to place is being re-established amongst the communities in temporary housing, encouraging people to stay on the island. Drawing on these findings, we make recommendations for 'place-based' emergency management with broad relevance to volcanic islands.

Resumen

Los estudios anteriores sobre el apego al lugar y los desastres se han centrado en su influencia en la percepción del riesgo, la evacuación, la reubicación y su restablecimiento después de un desastre. La erupción del Volcán de Tajogaite en La Palma en 2021 dañó gravemente las áreas urbanas, y muchos residentes aún esperan ser reubicados o regresar a sus hogares. Aquí demuestramos que: (i) si bien el apego al lugar no fue considerado durante las evacuaciones de emergencia, este tuvo una gran influencia en las experiencias de los residentes, y (ii) el apego al lugar se está reestableciendo entre las comunidades en viviendas temporales, lo que anima a las personas a permanecer en la isla. Con base en estos hallazgos, propongamos una gestión de riesgos "basada en el lugarçon amplia relevancia para las islas volcánicas.

Keywords: Place Attachment; Disaster Risk Reduction; Volcanic hazards; Disaster recovery; Risk management.

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1 Introduction

In the 1970s, human geographers began to think about place beyond the notion of being a point on a map, a physical place, or set of coordinates, instead trying to understand the meaning associated with places [Cresswell 2009]. Put simply, place is considered to be the sum of space and meaning [Harrison and Dourish 1996]. Place is essential for well-being; 'as embodied and social beings we need intimate place – house, neighbourhood, community and kinsfolk – for nurture and support' [Tuan 1997, p. 47]. Attachment to place can be defined as the relationship between an individual and a specific place; this includes the 'interplay of affect and emotions, knowledge and beliefs, and behaviours and actions in reference to a place' [Low and Altman 1992, p. 5].

The recognition of place attachment is crucial for disaster risk reduction (DRR), and for successful disaster recovery [Jamali and Nejat 2016]. Fried [1963] was amongst the first to recognise this by comparing the loss of place (due to disaster) to the grief of losing a loved one. Many have gone on to study the role of place attachment within disasters. For instance, Domingues et al. [2021] found an inverse relationship between risk perception and place attachment in coastal zones in Portugal. On the other hand, Bird et al. [2011] found that within both rural and urban populations communities exposed to volcanic hazards in Iceland (specifically from Katla and Eyjafjallajökull) a strong place attachment fostered a high-risk perception and awareness of hazards. It is difficult to generalise the relationship between place attachment and risk perception as this appears to vary between locations. It may be the case that hazard frequency plays an important role in this relationship, as the hazard may be a more accepted part of the landscape (and thus characteristic of the place) if it occurs more frequently. In the context of our study, destructive eruptions (like Tajogaite) are rare on La Palma—the 2021 eruption was the most destructive in recent history—and therefore may not be an accepted part of the landscape. Whilst the context of Bird et al. [2011] is similar to this study (volcanic hazard, and rural and urban population), the strong place attachment explored in our paper does not appear to translate into a high risk perception.

Place attachment can influence decision-making during disasters. For example, individuals with a strong place attachment may be more reluctant to evacuate, or relocate post-disaster [Adger et al. 2013]. In some cases, place attachment can be expressed as a spiritual connection to a volcano. This can strongly influence decisions to evacuate; for instance, Lavigne et al. [2008] found that amongst communities in Central Java, the spiritual connection to particular volcanoes not only attracts people to settle close to the volcano, but also makes them reluctant to evacuate or relocate post-disaster. Place attachment can also be expressed at different scales. It can be expressed as ties to land, or more commonly emotional ties to the home. Tuan [1975] explores place at various scales including the home and, interestingly, places of meaning within the home such as the fireplace, a favourite chair, or bed. These places may have sentimental value to the individual, and other members of the household recognise these places as belong-

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ing to the individual—for example, grandad's chair where he reads the newspaper [ibid]. Crucially, when discussing places of meaning within the home, 'the sentiment is there and we learn how strong it is when these small foci of our world are disturbed or threatened' [Tuan 1975, p. 154]. This is important to consider in relation to destruction of the home by lava flows, as explored in this work.

Place attachment can be a critical factor in the success of post-disaster recovery [Jamali and Nejat 2016]. The destruction caused by disasters can negatively impact place attachment and cause psychological harm [Knez et al. 2018]. This impact on psychological well-being and place attachment is exacerbated if the individual is forced to relocate due to a disaster [Jamali and Nejat 2016]. This is important in the context of volcano DRR as lava flows and pyroclastic density currents often result in permanent relocation of affected communities. Loss of place and forced relocation can significantly disrupt lives and livelihoods; many residents may be reluctant to relocate, or struggle to develop new place attachment, instead clinging to what they have lost, reluctant to accept the impossibility of recovering belongings or reoccupying the land [Fried 2000; Zheng et al. 2019]. Despite this, it is rarely written into plans for response, or recognised as a factor that can influence how people recover from an event, highlighting the need to devise strategies to improve inclusion of place attachment in DRR.

Whilst much research has focussed on understanding physical processes of the La Palma eruption, less attention has been paid to its social impacts or the lessons that can be learned. Accordingly, the aims of this work are to understand how attachment to place influenced (i) resident experiences of the eruption, and (ii) how it now shapes post-disaster recovery. The research involved interviews with people with a range of experiences of the 2021 eruption, seeking to understand their place attachment in La Palma, and how this played into their experience of the eruption and recovery. Consideration is also given to the PEVOLCA plan to understand the emergency management in the Canary Islands. Drawing on the findings, recommendations are offered to incorporate place attachment in risk management. It is hoped the study will stimulate further discourse on ways to include and/or recognise place attachment within risk management and DRR.

1.1 Background

Over the last 500 years, seven eruptions have been recorded on La Palma. These have occurred along the Cumbre Vieja rift, which runs down the centre of the island, and have usually produced basanitic to phonolitic lavas that flowed down the steep slopes of the rift zone [Carracedo 1999]. Figure 1 shows volcanic cones from previous eruptions in La Palma, which run down the Cumbre Vieja rift. The areas either side of the rift are at risk of a volcanic eruption. Notably, the Valle de Aridane (see Figure 1), is a densely populated area of the island that is at risk due to its proximity to the Cumbre Vieja rift. Three of the eruptions occurred within living memory: San Juan (1949), Teneguía (1971), and Tajogaite (2021). The San Juan and Teneguía eruptions were both preceded by months to years of seismicity [Araña 1999; Klügel et al. 1999]. The latter was fondly remembered by residents as a spectacle and a 'friendly volcano'. Many had enjoyed watching the eruption from the nearby flanks of San Antonio [Araña 1999; Barker et al. 2015]. The lack of destructive volcanism prior to 2021 goes some way to explaining the limited risk perception of the population prior to the Tajogaite eruption.

On the 19th September, 2021, a Strombolian eruption began on the western flank of the Cumbre Vieja ridge at 3:18 pm local time in the Cabeza de Vaca region on the island of La Palma in the Canary Islands [Carracedo et al. 2022]. The eruption quickly became the most destructive on historical record; over the course of 85 days, 1345 homes were destroyed, over 1000 ha of land were inundated by lava flows, and ~7000 people were evacuated [Comisión mixta para la reconstrucción, recuperación y apoyo a la isla de La Palma 2022]. Figure 3 provides a visual representation of the destruction to residential properties over the course of the eruption. The short duration of precursory seismicity is notable since previous eruptions on La Palma were preceded by months of seismicity. While the Canary Islands' emergency management plan, PEVOLCA, was triggered on 13th September, the eruption began when the island-wide Volcanic Traffic Light Alert system (VTLAS) was at 'yellow', before changing to 'red' two hours after the eruption started. This sowed confusion amongst local communities, with many people not realising an eruption was imminent, as the 'amber' stage was missed [Rey et al. 2023]. Further, while the PEVOLCA plan acknowledged the influences of past experience and social factors on risk perception, it was not explicit in recognising the importance of attachment to place. The eruption was officially declared over by authorities on 25th December 2021, following a 10-day precautionary period (see Figure 2 for a full timeline).

The grief experienced by the people of La Palma, particularly due to the loss of their homes has been intense for those affected. At the time of writing (October 2024), La Palma is still recovering from the eruption. Some residents who lost their homes were offered temporary accommodation in two types of prefabricated modular houses purchased by the government of Spain and the government of the Canary Islands—these included 36 wooden houses, and 85 houses made from shipping containers. This temporary accommodation was initially offered for at least three years, with the option of purchasing the property. The total cost of the damage is estimated to be in the region of 900 million Euros. Whilst aid was promised by the Government of Spain, the Canary Islands and La Palma, it has been criticised for being slow to reach those in need. The recovery has been heavily criticised by local people, provoking protests and petitions across the island and calls for a new 'volcano law' to offer protections against land lost due to a volcanic eruption. Evidently, key lessons should be drawn from the response to, and recovery from, the 2021 eruption to inform volcano DRR strategies in the Canary Islands.

2 Methods

This research draws on semi-structured interviews, latent coding analysis, and secondary sources. Qualitative primary data were collected during April–May 2023. Semi-structured

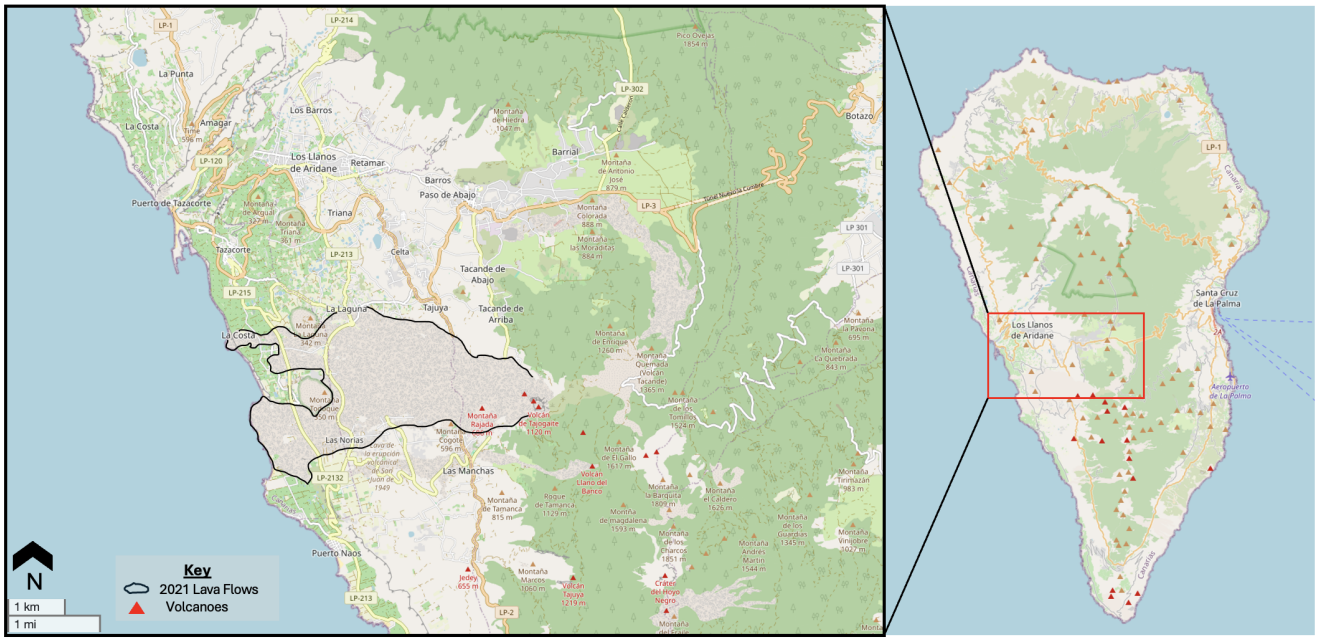

Figure 1: Map showing 2021 Volcán de Tajogaite lava flows in regional context. Created in https://www.openstreetmap.org.

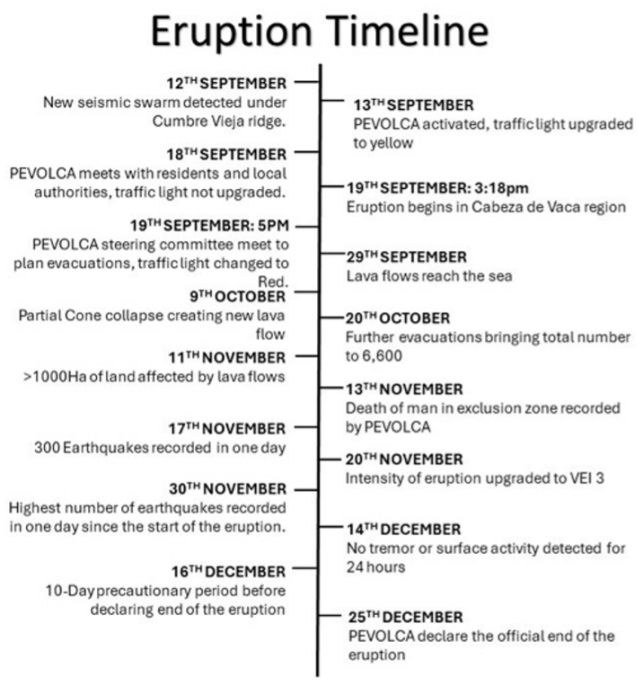

Figure 2: A timeline of the 2021 Tajogaite eruption (La Palma). Information for the creation of this timeline was taken from 𝕏 (formerly Twitter), various local newspapers, and sources from GeoTenerife's VolcanoStories project [Backhouse et al. 2023][a].

[a] https://geotenerife.com/volcanostories/

interviews use predetermined questions/themes to create a sense of structure yet allow for open-ended conversation and deviation from core questions [Phillips and Johns 2012; Adams 2015]. Thus, semi-structured interviews were chosen as they allow the interviewee to share their experience of the eruption in a way that allows the interviewer to respond to parts of the interviewees' experience, they feel is meaningful. It is also a suitable method for discussing sensitive topics as the respondent is not restrained by questions, and therefore better represents their experience. Interviewees were either contacted in advance after registering interest via an online survey or were approached in the field. In total fifteen interviews were conducted: one charity worker, three government officials, two scientists, four resident expatriates, and five native Palmero residents. The sampling technique was opportunistic in nature and therefore interview demographic is skewed by willing interview participants. Despite this, views from native and expatriate residents allow for an understanding of the range of place attachment that exists. Secondly, by interviewing key workers (e.g. scientists, emergency managers, charity work-

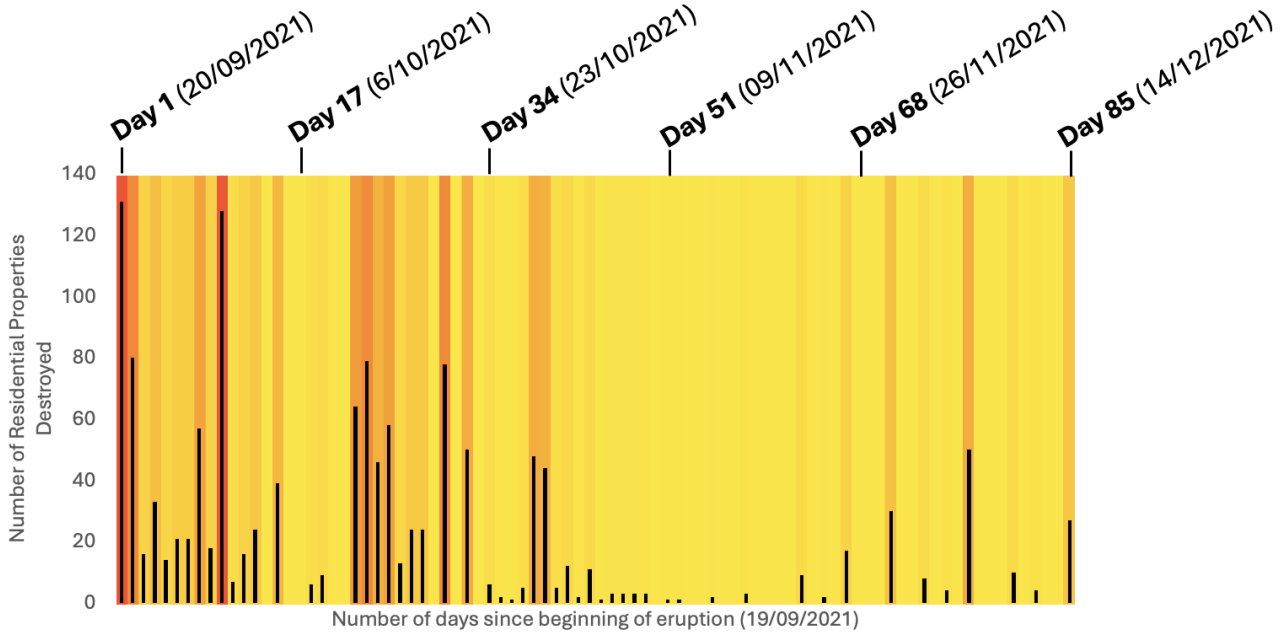

Figure 3: Daily number of residential properties destroyed over the 85-day eruption period, shaded based on number of properties destroyed, with red indicating a greater frequency and yellow indicating a lower frequency. Note a value of zero may indicate either no homes were destroyed or missing data. Data taken from 'Open Data La Palma' provided by the Cabildo de La Palma.

ers) it was hoped to obtain insights into the management of the emergency and plans for recovery.

All interviewees were provided with details of the project, how their data would be managed, and a confidentiality and consent agreement in line with UK GDPR guidelines. This study also passed formal ethical review by the Department of Geography (University of Cambridge); ethical approval was given on 31st March 2023. Interviews explored place attachment to La Palma (e.g. *How do you feel about the Island? When you think about La Palma what do you feel? How would you describe your relationship to the island?*), place attachment to the home (e.g. *What does home mean to you? Can you tell me about your house, do you have any favourite memories you would like to share?*), experience of the eruption (e.g. *Can you tell me about your experience of the eruption? How were you affected by the eruption? Did you feel prepared to evacuate – can you tell me about your experience?*), and how place attachment has changed following the eruption (e.g. *How do you feel about living in La Palma after the eruption? Why have you decided to stay? Has the eruption changed your relationship with the island, if so, how?*).

Elwood and Martin [2000] state that the location of the interview can influence participant response; therefore, interviews were conducted in sites chosen by the respondent to help them feel at ease. A gatekeeper was used to organise some interviews, this was reflected upon in the ethical review. Whilst semi-structured interviews allowed participants to explore their experience within a low-pressure environment, it must be noted semi-structured interviews can be time consuming and do not provide representative results of the whole population [Phillips and Johns 2012]. Interviews were conducted in English and Spanish by the first author, with the use of a translator (Spanish). The use of a translator sometimes affected the flow of the interview, and the impact of translation has been considered in interpreting results. All interviews were transcribed and translated before conducting latent content analysis, which involves determining underlying themes and meanings [Minichiello et al. 1995; Hay 2000].

Given the small sample size, secondary data have been drawn upon to supplement primary data, and to illustrate further the depth of attachment to place and the range of experience(s) of the 2021 eruption. One source consulted is the book 'Volcano Stories: From the Other Side' published by iLoveTheWorld, which compiles witness testimonies from those who experienced the eruption, collected a year after the eruption. Additional material was drawn from GeoTenerife's *VolcanoStories* project [Backhouse et al. 2023]*, an open access database of interviews and reports relating to the 2021 La Palma eruption.

3 Results

3.1 Attachment to Place in La Palma

Almost all interviewees demonstrated a very strong attachment to place, this attachment was either to the island, their municipality, or to home. In most cases, the home held deep significance to individuals. Homes are often passed down the generations and are focal points for family celebrations. Many residents, particularly the older generation, had lived in La Palma their whole lives. They expressed little desire to settle long-term elsewhere and revealed their pride in being *Palmeros*.

*https://geotenerife.com/volcanostories/

> *'I feel very connected with this island, I am proud to be living on this island, I am very connected. I moved away for university but always longed to return, it's not just the people but the island in general I feel connected to'*
> –Evacuated resident

The theme of being '*rooted*' in La Palma was particularly evident within interviews and secondary sources. In the mid-19th century, some residents emigrated to Central America for economic gain, eventually returning to their beloved *Isla Bonita.* A quote from '*Volcano Stories: From the Other Side*' highlights this connection:

> *'…they still hold La Palma, La Isla Bonita, in their hearts…the years pass but their beautiful island tugs at their heart and teaches us, their children, to love their roots as they did'*
> [iLoveTheWorld 2023, p. 173].

Conversely, interviews with expatriates did not exhibit such a strong attachment to place in comparison with residents who had grown up on the island, which is expected. For example, a British resident of La Palma recognised the difference in attachment to place, stating:

> *'We bought the house five years ago…I don't really have an attachment to this place, not like the Palmeros do'*
> –Evacuated resident (British)

Municipalities and towns were described by interviewees as focal points for communities and everyday activities, and residents appeared to feel very attached to communal places within their municipality.

> *'We* [Palmeros] *would have all of our families living close by. We would wake up in the morning and go to a certain café to have our coffee, with all of our neighbours. Or we would have our nieces and nephews living in the same area, close to us, and so we would see them every day…'*
> –Relocated resident.

3.2 Experiences of the eruption

Based on interviews, residents' strong attachment to place arguably amplified the trauma of the destruction caused by Volcán Tajogaite. Some residents had as little as 15 minutes warning to evacuate. Many did not know what items to save, what hazards could affect their home, and whether their home would survive. One resident described this experience:

> *'It was like going into a warzone…how do you decide what to rescue in 15-minutes? It was really leaving your home without being able to prepare, closing the door not knowing if you will open it again. I know one lady who doesn't consult the internet or read the newspapers, she told me she was just sitting having coffee and then she needed to evacuate'.*
> –Evacuated resident (Expatriate).

The difficulty and pain of watching the destruction unfolding on their island was overwhelming for residents. A quote from '*Volcano Stories: From the Other Side*' describes this feeling:

> *'When you see your island on the screen…the pain only increases, and you are overwhelmed with grief. Instead of the supposedly familiar surroundings there was only a dismal unreality'*
> [iLoveTheWorld 2023, p. 199]

The themes of 'loss,' 'grief,' and 'changed landscape' were common when interviewees described their experience of the eruption. This was particularly evident when describing the loss of the home. Many described how their home helped them feel connected to their ancestors and close relatives that had passed away, leaving the house to family, and the grief they felt due to losing this. Some described how it felt like losing a loved one for the second time.

For example one scientist stated:

> *'…seeing the people who have lost their homes is gut wrenching, for people here it's not just a house, it's their home, it's their whole life, it's not just a roof over their heads, it's their whole entire life, their past, present and hopes for the future'*
> –Scientist

From this quote we can see the home holds a vast sum of meaning, and symbolises ties to their past and present, it is so much more than bricks and mortar. We can therefore gain a sense of the loss that was felt.

The Catholic faith-based organisation 'Caritas' has been involved in the emergency response and recovery from the 2021 eruption. Volunteers worked to support residents who were being evacuated, and the charity offered financial aid to affected residents. Following the eruption, Caritas have been at the centre of affected communities, offering psychosocial care and financial assistance to affected residents. This places them in a position of being attuned to the needs and concerns of affected communities and so were approached to contribute to this work.

A representative from Caritas said:

> '*We observe it's been a real shock to families because they weren't prepared for that loss. It's still quite fresh for them, you know their whole life changed from one day to the next. With the initial eruption only certain people in certain towns were told 'prepare a little suitcase in case you need to evacuate, but you will probably go back to your house', and of course that didn't happen… The alert being raised might have had people better prepared and therefore keep more things instead of 'you've got 15-minutes evacuate now', they would've understood 'I might lose my house if there's another eruption' and mentally prepare yourself for that*'
> –Project co-ordinator, Caritas.

A quote from '*Volcano Stories: From the Other Side*' further explores this theme of ancestry, and secondary loss:

> '*On the night of September 19th, the volcano destroyed more than 100 years of my family's history. The eruption swallowed my great-grandma's house…Every time I opened the front door, I could smell a trace of my grandparents and feel their presence, as if they were there with me*'
> [iLoveTheWorld 2023, p. 162]

The theme of 'feeling-lost' was also highlighted within resident testimony. Many described how destruction to the built environment, particularly places such as cafes, bars, football fields etc., led to residents feeling lost without the communities former focal points. One resident explained:

> '*The places that we would go to everyday to meet our family or neighbours have been destroyed, our favourite café, the bakery we would go to for bread, it's all been lost, and we feel lost without it, and for that I feel much sympathy*'
> –Evacuated resident

Today, the area affected by the lava flows is scattered with carcasses of semi-destroyed homes, described by the then Mayor of Los Llanos in April 2023 as:

> '*Seeing the guts of people's dreams*'
> [Backhouse et al. 2023]

From this quote we gain a sense that the changed landscape could affect resident attachment to place due to the difficult reminder of the destruction and anguish caused by the eruption.

3.3 Experiences of the Post-eruptive phase

Some residents reported that once evacuated, communication on the state of their home was unclear. One described how they had been mistakenly informed their home had been destroyed on more than one occasion, which was very traumatic.

Now, within the recovery phase, place attachment is beginning to be restored, even amongst residents in temporary communities, and is also acting as a pull-factor to remaining on the island, and/or in the Valle de Aridane, post eruption, despite the risk a future eruption may pose. Despite their experience of trauma, when asked how they feel about their life in La Palma now, most residents responded positively, still expressing a deep connection to the island and no desire to relocate.

A representative from Caritas expressed how this attachment to place was assisting with recovery:

> '*It's actually what's keeping people going, looking forwards, and looking towards the future, that's why they want to stay here, keep working here, and keep living here, due to that deep connection*'
> –Project co-ordinator, Caritas

In temporary communities, place attachment is beginning to be restored as people settle into new homes and communities. However not all members of the communities feel settled. The temporary housing received a lot of criticism and stereotypes in the media, one resident echoed these sentiments stating:

> '*His mother was the first to receive a container house in "container ghetto land"*'
> –Evacuated resident (British).

It was unclear from interviews whether negative media attention affected how residents felt about the temporary accommodation. During a visit to the temporary community in Los Llanos, the first author saw many people sitting outside their houses, chatting with neighbours or going between houses. Some women sat in their doorway sewing or having coffee with their neighbours. The children played in the street, and it felt like a close community.

An interview with one resident shed light on how attachment to place is being re-established in this community:

> '*We've made changes and adapted the space; the truth is I am happy. Of course, if you look at it from the outside it's a container, but on the inside, it is a home – you don't have to look outside, look inside*'
> [Backhouse et al. 2023]

The faith-based organisation Caritas offer these communities regular psychosocial care and monetary assistance with rent. They stated the community struggling to connect to their new/temporary home was those in the container houses. They stated,

> *'They don't feel like it's their house yet, it's too early, they're comparing it to the old house that they had, they still feel like it's a strangers house'*
> –Project co-ordinator, Caritas

4 Discussion

This research confirmed the strong attachment to place amongst the population of La Palma and the key role it played in people's response to, and experience of, the 2021 Tajogaite eruption. The deep emotional connection people have to the land arguably amplified the loss experienced due to the destruction of homes and places of meaning. Escolà-Gascón et al. [2023] reported an initial decrease in 'sense of place' (a concept like place attachment) at the onset of the eruption, with sense of place then recovering in the months following the end of the eruption. The interviews highlighted that unclear communication regarding the destruction of homes, alongside short periods of notice for evacuation, created intense anxiety and uncertainty, arguably amplified by the strong emotional connection people had to places at risk. Additionally, there was little reference to the significance of place attachment for disaster risk reduction in the PEVOLCA report.

4.1 Place attachment and resident experience of the eruption

The strong attachment to place that exists in La Palma could explain why risk perception is low across the population, or perhaps place attachment is a competing factor against volcanic risk, with greater weight falling to the emotional ties to land than the risk of a destructive eruption. Interviewees expressed feeling unprepared to evacuate, and/or, lose places of meaning such as their homes. Additionally, despite generally recognising the fact they live on a volcanic island, this did not seem to translate effectively into an understanding of how a volcanic eruption might impact their homes [see also Domingues et al. 2021]. This apparent conflict could be attributed to a low-risk perception, however further data outlining the current risk perception of the population would be needed to confirm this.

Individuals view and process risk through their own sociocultural lens, therefore the level of perceived risk can depend on the decision maker's 'frame of reference' [Dash and Gladwin 2007, p. 70]. This 'frame of reference' can be shaped by various factors such as age, experience, emotions, gender, disability, and livelihood [Sigurdsson et al. 2015]. Experience is an important factor to further explore. Cognitive heuristics is an integral part of individual decision-making—the availability heuristic, for example, describes the individual drawing upon previous experience, or memories, of a particular event to make a decision [Richard Eiser et al. 2012]. There have been three eruptions within 'living memory' in La Palma: San Juan (1949), Teneguía (1971), and Tajogaite (2021). Therefore, it would be expected that some residents would be able to draw upon previous experience of volcanic eruptions in La Palma, and that those with previous experience would have a higher risk perception. However, many expressed they expected 'another Teneguía,' so were unprepared for the level of destruction caused by the 2021 eruption. The so called 'risk perception paradox' may explain this—this concept explores the assumption that individuals with a high-risk perception are more likely to engage in risk-mitigating behaviour [Wachinger et al. 2013]. It could be that a 'risk perception paradox' exists in La Palma, in which case, educational strategies should recognise that a high risk perception may not lead to effective action during an emergency. Or this relationship could be explained by their previous experience of an eruption was a lower severity than the 2021 eruption. Similarly, to what extent does place attachment shape this 'risk perception paradox'? Future research on what shapes risk perception in La Palma, and how the experience of the 2021 has influenced risk perception would be a valuable contribution to future volcanic risk management.

The findings of this research underscore the pivotal role of the home in shaping residents' experiences during the eruption. Although the trauma associated with losing a home was anticipated, the deep cultural and ancestral significance of the home emerged as a compelling theme. Residents often expressed that they had lost not just a physical structure but their past, present, future, and aspirations. Similar sentiments are echoed by Dugan [2007], who, reflecting on Hurricane Katrina (2005), describe the profound sense of loss, stating, 'when I left my home in September 2005, I left my culture, loved ones, and a sense of knowing who I am in relationship with my surroundings' (p. 41). Tuan [1975] elaborates on the cultural geography of home, emphasizing that it serves as a 'nurturing shelter' (p.154), and 'we go to all kinds of places, but we *return* home' (p.155). This idea of returning home is important to consider within the context of a volcanic disaster when the home is no longer there to return to, particularly in the context of La Palma. This loss of place due to disaster has devastating consequences [Scannell et al. 2016], of which we see evidenced in people's experience of the 2021 eruption, and the subsequent recovery process.

4.2 Place attachment and post-disaster recovery

Despite the deep feelings of grief and loss, the emotional connection to La Palma appears to endure and assist affected residents with recovering from the impacts of the eruption. Chamlee-Wright and Storr [2009] reported a similar phenomenon within communities affected by Hurricane Katrina in New Orleans; hurricane survivors insisted on the unique characteristics of New Orleans that meant 'there's no place like New Orleans' [Chamlee-Wright and Storr 2009, p. 621]. The authors attributed this to a combination of interconnected elements of place attachment, including 'thickly woven social networks based on friends, family, neighbours, particular foods and music' [Chamlee-Wright and Storr 2009, p. 623]. Similarly, there seems, for some residents, to be 'no place like La Palma'.

However, recovery may be hindered because of this strong place attachment as rebuilding/relocation could be unsuccessful if 'the desire to cling to fragments of a home persists against all possibility of living there again' [Fried 2000, p. 202]. For individuals who are unable to form new place attachments due to clinging to the connection of homes that have been lost, their ability to recover from the eruption may be hindered. Bukvic et al. [2022] have discussed how place attachment can influence the success of relocation, mainly as a DRR strategy, and therefore understanding attachment to place and the experience of the eruption could not be more important for the post-disaster recovery phase.

The importance of everyday activities and rituals, such as coffee with neighbours, were described in interviews and written testimony, particularly within the context of a certain town or municipality. Tuan [1975] outlines the importance of these everyday experiences for the construction of attachment to place at different scales. The theme of feeling lost due to the destruction of these sites where everyday rituals would play out is notable in my results. The changes in both the physical and social landscape due to the eruption means that the everyday activities that used to be achieved can no longer occur, and sites of relocation/evacuation may not be suitable to carry out these activities [Erikson 1995]. It has been shown that as a result, disasters can weaken attachment to place [Chamlee-Wright and Storr 2009]. It is understandable residents feel lost without these focal points within the social landscape, such as cafes, friends' houses, and town squares, as attachment to place is said to offer 'feelings of security, belonging and stability' [Hay 1998, p. 25]. The loss of these places that acted as focal points for the community, and the scattering of communities across the island, almost appears paralysing.

This highlights the importance for understanding the changing nature of place attachment in La Palma as the recovery stage progresses, as the success of the post-disaster recovery may be affected by the ability to recreate places/communities so that everyday activities can be successfully achieved. Barcus and Brunn [2010] explore the idea of *place elasticity* which allows residents to achieve their socioeconomic goals and everyday activities at a different place than the one they have lost, whilst simultaneously maintaining the emotional connection to that lost place. For relocated residents this would be useful for their recovery. The theme of feeling lost due to the destruction caused by the eruption, particularly due to the destruction of towns and subsequent scattering of communities, highlights the differing psychological impact of the eruption across communities. A future study may consider the spatial variation of attachment to place following the eruption.

5 Recommendations and Concluding Remarks

Insights from this study suggest future volcanic risk management in the Canary Islands, and potentially other volcanic archipelagos, would benefit from incorporating psychological and cultural dimensions of place attachment—people's emotional ties to land—via community engagement. Key to achieving this is recognising how place attachment can shape people's perception of risk, and therefore decision-making, as discussed. Here we propose a '*place-based*' approach to risk management.

5.1 Emergency response

Whilst early warning systems are useful tools for conveying changes in risk to the population, differences in perception of risk associated with the changing hazard (across Civil Defence and the Public) can cause a failure of the system as each stakeholder has differing expectations of what may occur at each stage of the warning system [De la Cruz-Reyna and Tilling 2008]. A study of the VTLAS used for Popocatépetl (Mexico) found the public struggled to understand the differences between the alert levels, particularly yellow and amber [De la Cruz-Reyna and Tilling 2008]. It was recommended that changes in activity be described in terms of risk to a specific town/region, along with timescales for the possible duration of the hazard [De la Cruz-Reyna and Tilling 2008]. Adopting this strategy of place-specific information (instead of an island-wide VTLAS) would be a useful adaptation for the VTLAS used in the Canary Islands going forward, particularly following the reported confusion the VTLAS created before the eruption.

Secondly, future risk communication should consider the emotional ties residents have to their towns and homes. Budimir et al. [2020] stress the importance of clear communication of changing risk to homeowners and stakeholders and emphasise the value of outreach activities for successful risk communication. The deep place attachment and significance of the home, in La Palma, arguably amplified the inherent uncertainty associated with the 2021 eruption. Future communication of risk needs to be sensitive to this emotional connection to particular sites, and how place attachment may influence how messaging is received and used in the decision-making process. Information should be broken down into 'lay' terms so that the population understand how places they are attached to are at risk, and the changing nature of that risk. Furthermore, plans for displaced communities both in the short- and long-term emergency response, should consider the emotional ties to place and communities. In the context of the 2021 eruption, as far as we were aware, community members housed in temporary housing were not given the option of living close to old neighbours or community members, thus communities were not able to stay together.

5.2 Pre-crisis risk management

A sense of feeling unprepared, practically and psychologically, was commonly expressed in interviews. Despite recognising La Palma's volcanic history, this did not appear to translate into an awareness of the various volcanic hazards the island is exposed to. Residents mentioned how if they had understood how their homes may be affected by an eruption, they would have been better equipped practically and psychologically for evacuation and/or the loss of their homes. Outreach activities within communities offering educational information on the hazards that their homes are exposed to, might help improve preparedness. Additionally, if this awareness of volcanic hazards and their associated risks were to be factored into an

individual's place attachment, it may also improve risk perception.

To conclude, this research has evidenced that strong place attachment plays a pivotal role in the everyday experience of islanders. The destruction of urban centres caused by the 2021 Volcán de Tajogaite eruption was unprecedented, and the subsequent loss experienced by the affected population has been intense. This research has shown a strong place attachment exists in La Palma, particularly to the *home*. For Palmeros, the home appears to symbolise ancestral ties and hopes for the future. It is therefore unsurprising that place attachment shaped resident experience of the 2021 Volcán de Tajogaite eruption largely by amplifying the trauma and uncertainty associated with the crisis and affecting risk perception. Three years after the eruption, place attachment appears to be contributing to recovery, with many affected residents expressing a strong desire to rebuild their lives in La Palma. It should be noted however, strong attachment to places that have been destroyed can hinder recovery [Fried 2000]. A desire to build on top of lava flows, exactly where their previous home was, has been expressed by some residents, whilst others still grapple with a sense of feeling uprooted and lost without places of importance. As La Palma looks towards her future, understanding how place attachment is affecting residents' ability to recover from the eruption will be imperative.

Relatively little consideration was given to place attachment in the management plans for the eruption, as well as plans for recovery. This research has alluded to the importance of considering attachment to place within volcanic risk management, giving recommendations for so called *place-based risk management*. These aforementioned recommendations are relevant to other volcanic islands, particularly where strong place attachment shapes how populations experience volcanic hazards.

Author Contributions

RFR designed the study, collected the data, analysed the results and drafted the manuscript. CO contributed edits to the manuscript.

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Data Availability

The data used in this study are not available to third parties due to the confidentiality agreement signed by interviewees, in-line with their rights under UK General Data Protection Regulation (GDPR) rules. The secondary data taken from GeoTenerife's Volcano Stories can be accessed online https://geotenerife.com/volcanostories. Secondary data were also taken from iLoveTheWorld's publication '*Volcano Stories: From the Other Side*', specifically from the English translation, available for purchase.

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References

Adams, W. C. (2015). "Conducting Semi-Structured Interviews". *Handbook of Practical Program Evaluation*. Edited by K. E. Newcomer, H. P. Hatry, and J. S. Wholey. Wiley. Chapter 19, pages 492–505. ISBN: 9781119171386. DOI: 10.1002/9781119171386.ch19.

Adger, W. N., J. Barnett, K. Brown, N. Marshall, and K. O'Brien (2013). "Cultural dimensions of climate change impacts and adaptation". *Nature Climate Change* 3(2), pages 112–117. DOI: 10.1038/nclimate1666.

Araña, V. (1999). "Comentarios sobre la erupción del Volcán Teneguia en 1971". *Enseñanza de las Ciencias de la Tierra* 7(3), pages 262–266.

Backhouse, S., B. Ireland, A. Wynne-Jones, and R. Rice (2023). *Volcano Stories*. URL: https://geotenerife.com/volcanostories (visited on 05/25/2025).

Barcus, H. R. and S. D. Brunn (2010). "Place elasticity: exploring a new conceptualization of mobility and place attachment in rural america". *Geografiska Annaler: Series B, Human Geography* 92(4), pages 281–295. DOI: 10.1111/j.1468-0467.2010.00353.x.

Barker, A. K., V. R. Troll, J. C. Carracedo, and P. A. Nicholls (2015). "The magma plumbing system for the 1971 Teneguía eruption on La Palma, Canary Islands". *Contributions to Mineralogy and Petrology* 170(5–6). DOI: 10.1007/s00410-015-1207-7.

Bird, D. K., G. Gísladóttir, and D. Dominey-Howes (2011). "Different communities, different perspectives: issues affecting residents' response to a volcanic eruption in southern Iceland". *Bulletin of Volcanology* 73(9), pages 1209–1227. DOI: 10.1007/s00445-011-0464-1.

Budimir, M., A. Donovan, S. Brown, P. Shakya, D. Gautam, M. Uprety, M. Cranston, A. Sneddon, P. Smith, and S. Dugar (2020). "Communicating complex forecasts: an analysis of the approach in Nepal's flood early warning system". *Geoscience Communication* 3(1), pages 49–70. DOI: 10.5194/gc-3-49-2020.

Bukvic, A., A. Whittemore, J. Gonzales, and O. Wilhelmi (2022). "Understanding relocation in flood-prone coastal communities through the lens of place attachment". *Applied Geography* 146, page 102758. DOI: 10.1016/j.apgeog.2022.102758.

Carracedo, J. C., V. R. Troll, J. M. D. Day, H. Geiger, M. Aulinas, V. Soler, F. M. Deegan, F. J. Perez-Torrado, G. Gisbert,

E. Gazel, A. Rodriguez-Gonzalez, and H. Albert (2022). "The 2021 eruption of the Cumbre Vieja volcanic ridge on La Palma, Canary Islands". *Geology Today* 38(3), pages 94–107. DOI: 10.1111/gto.12388.

Carracedo, J. C. (1999). "Growth, structure, instability and collapse of Canarian volcanoes and comparisons with Hawaiian volcanoes". *Journal of Volcanology and Geothermal Research* 94(1–4), pages 1–19. DOI: 10.1016/s0377-0273(99)00095-5.

Chamlee-Wright, E. and V. H. Storr (2009). ""There's No Place like New Orleans": Sense of Place and Community Recovery in the Ninth Ward after Hurricane Katrina". *Journal of Urban Affairs* 31(5), pages 615–634. DOI: 10.1111/j.1467-9906.2009.00479.x.

Comisión mixta para la reconstrucción, recuperación y apoyo a la isla de La Palma (2022). *Informe sobre las actuaciones y medidas emprendidas tras la erupción del volcán de Cumbre Vieja (La Palma), seis meses después del inicio de la emergencia*. Agencia Estatal Boletín Oficial del Estado. URL: https://www.mpr.gob.es/prencom/notas/Documents/2022/060622-informe_palma.pdf. Madrid.

Cresswell, T. (2009). "Place". *International Encyclopedia of Human Geography*. Elsevier, pages 169–177. ISBN: 9780080449104. DOI: 10.1016/b978-008044910-4.00310-2.

Dash, N. and H. Gladwin (2007). "Evacuation Decision Making and Behavioral Responses: Individual and Household". *Natural Hazards Review* 8(3), pages 69–77. DOI: 10.1061/(asce)1527-6988(2007)8:3(69).

De la Cruz-Reyna, S. and R. I. Tilling (2008). "Scientific and public responses to the ongoing volcanic crisis at Popocatépetl Volcano, Mexico: Importance of an effective hazards-warning system". *Journal of Volcanology and Geothermal Research* 170(1–2), pages 121–134. DOI: 10.1016/j.jvolgeores.2007.09.002.

Domingues, R. B., S. N. d. Jesus, and Ó. Ferreira (2021). "Place attachment, risk perception, and preparedness in a population exposed to coastal hazards: A case study in Faro Beach, southern Portugal". *International Journal of Disaster Risk Reduction* 60, page 102288. DOI: 10.1016/j.ijdrr.2021.102288.

Dugan, B. (2007). "Loss of Identity in Disaster: How Do You Say Goodbye to Home?" *Perspectives In Psychiatric Care* 43(1), pages 41–46. DOI: 10.1111/j.1744-6163.2007.00105.x.

Elwood, S. A. and D. G. Martin (2000). ""Placing" Interviews: Location and Scales of Power in Qualitative Research". *The Professional Geographer* 52(4), pages 649–657. DOI: 10.1111/0033-0124.00253.

Erikson, K. (1995). *A new species of trouble: The human experience of modern disasters*. WW Norton & Company. 264 pages. ISBN: 978-0393313192.

Escolà-Gascón, Á., N. Dagnall, A. Denovan, M. Diez-Bosch, and J. L. Micó-Sanz (2023). "Social impact of environmental disasters: Evidence from Canary Islands volcanic eruption". *International Journal of Disaster Risk Reduction* 88, page 103613. DOI: 10.1016/j.ijdrr.2023.103613.

Fried, M. (1963). *Grieving for a lost home*. Edited by L. J. Duhl. New York: Basic Books. 410 pages.

Fried, M. (2000). "Continuities and discontinuities of place". *Journal of Environmental Psychology* 20(3), pages 193–205. DOI: 10.1006/jevp.1999.0154.

Harrison, S. and P. Dourish (1996). "Re-place-ing space: the roles of place and space in collaborative systems". *Proceedings of the 1996 ACM conference on Computer supported cooperative work*, pages 67–76.

Hay, I., editor (2000). *Qualitative Research Methods in Human Geography*. 3rd edition. Oxford: Oxford University Press. 432 pages. ISBN: 9780195430158.

Hay, R. (1998). "A rooted sense of place in cross-cultural perspective". *Canadian Geographies / Géographies canadiennes* 42(3), pages 245–266. DOI: 10.1111/j.1541-0064.1998.tb01894.x.

iLoveTheWorld (2023). *Volcano Stories: From the Other Side*. Edited by M. González Suárez, M. N. Pérez Cejas, and P. Fernández Vinuesa. Translated by D. Duffield. 1st edition. Imprenta Reyes, SL. 284 pages. ISBN: 978-84-09-463909.

Jamali, M. and A. Nejat (2016). "Place attachment and disasters: Knowns and unknowns". *Journal of Emergency Management* 14(5), pages 349–364. DOI: 10.5055/jem.2016.0299.

Klügel, A., H.-U. Schmincke, J. White, and K. Hoernle (1999). "Chronology and volcanology of the 1949 multi-vent rift-zone eruption on La Palma (Canary Islands)". *Journal of Volcanology and Geothermal Research* 94(1–4), pages 267–282. DOI: 10.1016/s0377-0273(99)00107-9.

Knez, I., A. Butler, Å. Ode Sang, E. Ångman, I. Sarlöv-Herlin, and A. Åkerskog (2018). "Before and after a natural disaster: Disruption in emotion component of place-identity and wellbeing". *Journal of Environmental Psychology* 55, pages 11–17. DOI: 10.1016/j.jenvp.2017.11.002.

Lavigne, F., B. De Coster, N. Juvin, F. Flohic, J.-C. Gaillard, P. Texier, J. Morin, and J. Sartohadi (2008). "People's behaviour in the face of volcanic hazards: Perspectives from Javanese communities, Indonesia". *Journal of Volcanology and Geothermal Research* 172(3–4), pages 273–287. DOI: 10.1016/j.jvolgeores.2007.12.013.

Low, S. M. and I. Altman (1992). "Place Attachment". *Place Attachment*. Edited by I. Altman and S. M. Low. Springer US, pages 1–12. ISBN: 9781468487534. DOI: 10.1007/978-1-4684-8753-4_1.

Minichiello, V., R. Aroni, E. Timewell, and L. Alexander (1995). *In-depth interviewing: Principles, techniques, analysis*. 2nd edition. Cheshire: Longman.

Phillips, R. and J. Johns (2012). Sage. 240 pages. ISBN: 9780857025876.

Rey, T., F. Leone, T. Candela, S. Defossez, F. Vinet, F. Parat, M. Gherardi, L. Medina, F. Lavigne, I. Martin, and Z. Guillet (2023). "L'éruption du Tajogaite (Cumbre Vieja) à La Palma, Canaries : de l'éruption volcanique à la crise territoriale". *EchoGéo*. DOI: 10.4000/echogeo.24450.

Richard Eiser, J., A. Bostrom, I. Burton, D. M. Johnston, J. McClure, D. Paton, J. van der Pligt, and M. P. White (2012). "Risk interpretation and action: A conceptual framework for responses to natural hazards". *International Journal*

of Disaster Risk Reduction 1, pages 5–16. DOI: 10.1016/j.ijdrr.2012.05.002.

Scannell, L., R. S. Cox, S. Fletcher, and C. Heykoop (2016). ""That was the Last Time I Saw my House": The Importance of Place Attachment among Children and Youth in Disaster Contexts". *American Journal of Community Psychology* 58(1–2), pages 158–173. DOI: 10.1002/ajcp.12069.

Sigurdsson, H., B. Houghton, S. McNutt, H. Rymer, and J. Stix, editors (2015). 2nd edition. Elsevier. ISBN: 9780123859389. DOI: 10.1016/c2015-0-00175-7.

Tuan, Y.-F. (1975). "Place: An Experiential Perspective". *Geographical Review* 65(2), page 151. DOI: 10.2307/213970.

– (1997). "Sense of place: what does it mean to be human?" *American journal of theology & philosophy* 18(1), pages 47–58.

Wachinger, G., O. Renn, C. Begg, and C. Kuhlicke (2013). "The Risk Perception Paradox—Implications for Governance and Communication of Natural Hazards". *Risk Analysis* 33(6), pages 1049–1065. DOI: 10.1111/j.1539-6924.2012.01942.x.

Zheng, C., J. Zhang, Y. Guo, Y. Zhang, and L. Qian (2019). "Disruption and reestablishment of place attachment after large-scale disasters: The role of perceived risk, negative emotions, and coping". *International Journal of Disaster Risk Reduction* 40, page 101273. DOI: 10.1016/j.ijdrr.2019.101273.