



Years matter: the role of memory and place attachment in remote Nordic areas facing natural hazards

Matthias Kokorsch¹ · Rico Kongsager² · Leikny Bakke Lie³ · Nina Baron² · Kerstin Eriksson⁴

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Abstract

Remembrance, commemoration, and specific dates play an important role in many societies and cultures. They can be about positively connotated events with societal impacts, such as reunifications or the gaining of independence, but also disastrous or other devastating events on a national or international scale. In disaster risk areas, there are various ways such events are addressed. While for some communities they are an active part of the local history and the living memory, other communities tend to neglect or disregard such events. By applying a classification system, building on the ideas of Assmann (2011) and Halbwachs (1992), we identify active and passive forms of remembering in five case study areas in the Nordic countries. We investigate the possible positive and negative outcomes of the collective and cultural memory and how they relate to place attachment as well as capacity building. An example of positive outcomes is an even closer-knit community, exhibiting place-protective behavior, that learns from past events and is better prepared for future disasters. A negative example at the local scale is willful blindness and the neglect of any risk. However, the society outside an affected settlement is also important in the creation and manifestation of the collective and cultural memory: stigmatization and ascription can be negative side effects. Small and remote communities may be recognized by society at large for only one point in time—a year and a disaster—thus sidelining the positive attributes of such communities.

Keywords Place attachment · Memory · Natural hazards · Capacity building · Nordic countries

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✉ Matthias Kokorsch
matthias@uw.is

Rico Kongsager
rico@kp.dk

Leikny Bakke Lie
leikny.b.lie@uit.no

Nina Baron
niba@kp.dk

Kerstin Eriksson
kerstin.eriksson@ri.se

¹ University Centre of the Westfjords, Suðurgata 12, Ísafjörður 400, Iceland

² Emergency and Risk Management, University College Copenhagen, Copenhagen, Denmark

Introduction

Memories of past events play a large role in how we understand future risks and how individuals and communities respond to those risks. Insight into collective memories, or lack thereof, is central to understanding how communities respond to risks.

The focus of this paper is the role that remembrance, commemoration, and specific dates play in shaping societal and cultural dynamics in relation to emergency preparedness and response. Events, both celebratory and devastating, leave enduring marks on the collective consciousness

³ Department of Technology and Safety, UiT The Arctic University of Norway, Tromsø, Norway

⁴ Division of Built Environment, RISE Research Institutes of Sweden, Gothenburg, Sweden
Extended author information available on the last page of the article

of communities, influencing not only how they remember the past but also how they prepare for and respond to future challenges. Positive outcomes of memory include fostering a sense of unity and learning from past events, thereby enhancing preparedness for future disasters (Appleby-Arnold et al. 2018; Schenk 2015). Conversely, negative outcomes may involve the continuation of trauma or a disregard and neglect for the risks posed by potential future hazards (Amundsen and Dannevig 2021; Shtob 2019). This paper dives deeper into the multifaceted nature of memory and its classification into collective, cultural, and communicative types. It explores the foundational theories of memory, proposed by Assmann (2011) and Halbwachs (1992), and their relevance to understanding the social and cultural contexts that shape community identities and responses to disasters.

The concept of place attachment examines the emotional bonds and significance attributed to physical environments, the social aspects of a community, and the natural environment, thereby also influencing both individual and collective responses to and perceptions of risks (Lewicka 2008; Raymond et al. 2010). This paper examines how memory, in its various forms and appearances, relates to place attachment and capacity building to influence the resilience of communities to natural hazards. Through this lens, the paper's exploration contributes to a broader understanding of disaster recovery, not just as a return to a previous status quo but as an opportunity for transformation, learning, and progressive development.

Focusing on five case study locations in the Nordic countries, this paper identifies communities bound by shared experiences of one or two significant events that have become integral to their collective and/or cultural memory. The research questions are as follows: (1) What forms of hazard-related memory can be identified within the case study communities? (2) How does memory influence place attachment? and (3) What is the impact of memory on capacity building and risk management?

Theoretical framing

Forms of memory

Memory takes various forms, including individual, societal, temporal, and spatial aspects. It is intertwined with the sociocultural context and the framing of the past by a community (Fuentelba 2021). Collective, cultural, and communicative memory are generic terms used to classify memory (Assmann 2011; Halbwachs 1992; Monteil et al. 2020). Within this classification, Halbwachs' (1992) work serves as a foundational framework, focusing on the interplay between individual memories and the broader social context in which they reside. While encompassing historical events, memories

combine the values, traditions, and cultural narratives that frame a society's identity. In addition, Halbwachs asserts that memories are inherently subject to interpretation, with social structures significantly influencing their formation and consolidation (Halbwachs 1992). Embedded within this understanding of collective memory is the role of various social frameworks, such as family, religion, and community, in shaping the narrative of the past (Halbwachs 1992). These frameworks facilitate the organization and categorization of memories, focusing on key events and figures that reinforce a sense of unity, cohesion, and attachment within the group.

Collective, cultural, and communicative memory are subject to interpretational nuances, often leading to their interchangeable application. A central criterion for differentiation lies in the mode of knowledge and memory dissemination. In communicative memory, it is the oral transmission; in cultural memory, it is the existence of physical records (Song et al. 2021). In addition, the temporal and generational aspects serve as dimensions for differentiation. Communicative memory can be considered a lived memory; a memory based on having witnessed a certain event or knowing witnesses, while cultural memory resonates with distant historical occurrences (Fanta et al. 2019; Schenk 2015).

Cultural memory centers on traditions, transmissions, and transferences (Assmann 2011). While communicative memory is transferred from eyewitnesses to the next generation, cultural memory is dependent on records and storage (Schenk 2015). The interplay between memory and institutional commemoration exemplifies the dynamics that Halbwachs (1992) expands on. An example of these interactions is institutional memories that are kept alive and reinforced through official commemoration and the celebration of anniversaries (de Guttry and Ratter 2022).

Cultural and communicative memory build the foundation of collective memory, which "conveys people's accounts of the past through rituals, social interaction, artefacts and text" (Normann 2022:809). Collective memory and its transmission are meaning-making processes. They weave the strands of past, present, and future, individual and collective, into significant patterns. In doing so, they shape identities and help people make sense of their world (O'Connor 2022). Halbwachs (1992) considers collective memory as the shared reminiscences and understandings of a group, encompassing not only historical events but also the values, traditions, and cultural narratives that shape a society's identity.

The capacity for communities to engage in both active and passive modes of remembering parallels their ability to forget (Assmann 2011; Monteil et al. 2020). The dichotomy of remembering and forgetting also carries political implications, embodying questions about what a society or community deems worthy of preservation in their collective memory. Memory formation can lead to conflict as groups may

have different experiences or levels of enthusiasm for historical events (Fuentelba 2021; Lewicka 2008). Halbwachs (1992) critiques the notion of an objective and absolute historical truth, suggesting that memories are always subject to interpretation and manipulation based on prevailing societal norms and interests. In this regard, memory places carry an important function. They are physical spaces imbued with symbolic meaning that aid in the preservation and transmission of collective memories (Halbwachs 1992). Memory storage and memory spaces can lead to conflicts when discrepancies arise in the process of memory creation between self-perception (within a community) and ascription (from external entities). Remembering is a multifaceted endeavor, incorporating various forms such as visual imprints, monuments, ceremonial gatherings, and historical chronicles. It can thus be tangible (monuments, museums, and archives) and intangible (ceremonies, storytelling, and oral histories) (Boret and Shibayama 2018).

The political dimension of memory is represented in the difference between functional and storage memory. The former scrutinizes sense-making, meaning, and legitimization—both regarding the past, but also future decisions of the actors involved (de Guttry and Ratter 2022). For instance, the construction of an avalanche barrier can be the result of functional memory, where past occurrences validate modifications to the built environment and alterations in land-use policies. Storage memory does not reflect the political dimension or the aspect of sense-making and is usually informal and unconscious unless institutions consciously undertake memory-preservation efforts (de Guttry and Ratter 2022). A good balance between those two forms of memory is important to avoid it being static and rigid, but, on the contrary, flexible and open to change (de Guttry and Ratter 2022).

Memory and risk management

Memories play an important role in risk management and wield a dual role: serving as a means for individuals to navigate trauma in the aftermath of catastrophic events and concurrently emerging as integral components of community narratives (Monteil et al. 2020; Zavar and Schumann 2019). Societies convey diverse methods of mourning and commemorating the disasters, and the individuals affected. These methods encompass both tangible manifestations and intangible expressions (Boret and Shibayama 2018). An active memory of past events can be key for protective behavior, coping strategies, and risk perception (Appleby-Arnold et al. 2018; Schenk 2015). Within this context, risk perception emerges as an individual process, based on available information and prior experiences combined with societal norms and cultural frameworks (de Guttry and

Ratter 2022). Without previous knowledge, experience, or response mechanisms—may it be active or stored—avoidable disasters may occur in tandem with an underestimation of risk. The existence of communicative and living memory is crucial for certain risk-related behaviors, while written information and chronicles seem to have little impact on people's behavior (Fanta et al. 2019). Additionally, remembering and behavior are linked to the physical location of memory: Is it part of the communicative memory within a community or is the memory stored in archives, maybe even out of reach for a community?

One way to actively remember past events, even those that date back several generations, is materializing and memorializing. Using the example of floods, materialization can be defined as “the practices by which flood event, 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” (McEwen et al. 2017:19). Collective memory that places a disaster in the past—and only in the past—may have the contrary impact, leading to the underestimation of future risks and a so-called disaster gap (Schenk 2015; Walshe et al. 2020). Disasters of the past might be attributed to a lack of general knowledge, lack of equipment, or lack of scientific knowledge. This can, in return, lead to a false faith in progress. In addition, memories usually cease over time, especially between generations. This can result in a collective forgetting of events by a community (Fanta et al. 2019; Song et al. 2021). Schenk underscores a temporal threshold of approximately three to four generations post-event for being considered communicative memory and states that “beyond this limit we can no longer really speak of a common area of experience and must consequently question the legitimacy of e.g. drawing analogies between the past and the respective present” (Schenk 2015:8).

One example of a combination of a disaster gap and the collective forgetting of historic events is outlined by Fanta et al. (2019), who discuss the settlement structures near bodies of water despite the potential risks of flooding. Apart from potential trade-offs, the lack of historical memory also leads to the establishment of settlements in risk zones (Fanta et al. 2019). This is the difference between living memory (passed on by eyewitnesses) and historical memory (loss of eyewitness and thus the living memory) (Fanta et al. 2019). With the transition from living memory to historic memory, one can observe a decrease in risk awareness. This can be counteracted by processes of active remembering and the bridging of communicative, collective, and cultural memory and the “perpetual presence” of a disaster through symbols and practices (Fuentelba

2021), which can create on the one hand a “culture of disaster” but on the other hand generate fatigue and feelings of stigmatization.

“Cultures of disaster develop primarily in regions which are subject to repeated natural hazards, where certain social and cultural phenomena—as religious interpretations, disaster management, preventive measures or institutions like help organisations or insurances—emerge from repeated experiences of disasters and are stabilized by a repetitive cultural memory” (Kempe 2007:328).

One example of such development is the constitution of a “coastal culture of disaster” in Northern Germany, where people live with continuous threat from wind and water (Kempe 2007). This culture, and a combination of collective memory and risk awareness, can lead to improved disaster risk management (Martinez et al. 2020). Even though in some areas the last floods or storm surges date back over a century, the memory is kept alive through memory marks and other forms of active remembering (Martinez et al. 2020). The marks can be kept active if the information is passed on to the next generation, for instance through school visits to these marks or grandparents taking their grandchildren to tell the story of the marks. Without this active passing on of these events, the meanings of the marks might be forgotten and thereby have less of a role concerning future events. Boret and Shibayama (2018) also point to the importance of memorial monuments in disaster risk reduction despite—or particularly because of—their timeless representation.

Cultures of disaster or other forms of active remembering do not, however, provide only positive outcomes, and one cannot generalize about the outcomes of memory building. The risk of fatigue concerning disaster cultures and memorizing should not be underestimated (Monteil et al. 2020). Examples from typhoon Haiyan (Philippines) show that a certain fatigue can also be the result of constant memories and permanent warnings, which then leads to an underestimation of risks (Lejano et al. 2021). In addition, if there is only memory or knowledge among some experts but hardly any communicative and collective memory, locals may lose interest and understanding of a given risk. Concerning climate change-related hazards, this carries several risks, since these will potentially increase in frequency and severity (IPCC 2022). Hence, some communities may have a false sense of safety, thinking that certain events only happen once in a lifetime, or underestimate the increasing risk due to surviving similar, yet less severe, events (Amundsen and Dannevig 2021; Lejano et al. 2021).

The different modes of memory can have an impact on place attachment and vice versa; we consider memory and place attachment as interdependent concepts. Shared

memory can be an important factor in the creation of an identity of a place and the self-identification of its inhabitants (Aslani and Amini Hosseini 2022; Hussein et al. 2020). The emotional connection to a place has an impact on the perception of risk and thus risk-related behavior (Lemée et al. 2020). According to Lemée et al. (2020:315) “visual signs of threat, such as protective structures, have a better power to predict protective behavior. It may be necessary to encourage these kinds of visual signs in the public area to encourage protective behaviors.” Consequently, monuments or marks can work as signs of threats in a retrospective manner.

As mentioned above, memory, and in particular visual memory, can carry the threat of stigmatization. A certain place can be associated with a devastating event—especially remote and small communities with a supposedly uneventful history and few points of memory that may be related to only one disaster. This in turn can have an impact on the local economy and migration patterns (McEwen et al. 2017).

Findings

The analysis of place-based memory and its impact on place attachment and risk management is based on data collected during field visits in five different Nordic communities (Fig. 1) in the period between autumn 2021 and winter 2022. All case studies apply qualitative methods with various forms of interview techniques.

Storms on the Faroe Islands (1988)

On the Faroe Islands, data acquisition took place during four field trips, which consisted of three sequential steps. The first step was to engage with key informants, the second was to organize a workshop with villagers, and the third was to interview villagers. The study also included document analysis and explorative observations. Further details about the applied approach can be found in Kongsager and Baron (2024) since the following findings are extracts collected in parallel with this case study.

The inhabitants of the study area (Viðareiði and Hvan-nasund), as revealed through interviews, have several detailed stories about storms, including specific dates, wind directions, warnings, and impacts. Regarding the latter, it is details of who was affected, which houses were destroyed or damaged, and information concerning people who assisted and how. Certain storms are deeply rooted in the minds of the interviewees, with the 1988 Christmas storm being the one mentioned in almost all interviews. Although there is an absence of formal commemoration or tangible structures, a collective memory emerges, signifying a period marked by devastating storms: following the Christmas storm, the



Fig. 1 Case study locations

islands were struck twice in January 1989. Experiencing three severe storms within a month is very unusual, which may explain the detailed memories.

The 1988 storm persists in the form of narratives, and it extended to a documentary produced by the national broadcasting company in 2013, marking the 25th anniversary of the event. While the memory remains uncontested, a generational dimension is evident, influenced by varying ages during the occurrence—some were adults, others were children, and some were not yet born. Consequently, memories are constructed through oral accounts, shaping individual and collective identities and fostering a sense of place attachment. These memories play a fundamental role in self-identification and place attachment, influencing the categorization of localities as safe or hazardous during storms. Spatial awareness of the impact of wind directions on different locations within villages emerged post-1988, illustrating the influence of memory on local knowledge and culture. The active resistance to memory preservation by some individuals and the wider community is noteworthy—reflecting a cultural disposition to downplay the severity and danger of hazards, storms included, and considering them integral to daily life in these communities. The Faroese portray themselves as tough and brave people and storms are simply a part of living in the communities and on the Faroe Islands in general. They see storms as a part of everyday life since they occur several times a year and are therefore often not perceived as something extreme.

The Faroese culture exhibits active forms of remembering, evident in memorial places dedicated to various hazards and tragic events, predominantly those involving fishermen lost at sea. However, the absence of a memorial site for the 1988 storm is attributed to the absence of casualties. Instead, the event is commemorated through stories shared within

families and communities, with physical remnants like ruins and foundations serving as unofficial *sites* that perpetuate the memory. This *bottom-up* approach can be seen as public participation in city/landscape planning; however, the unofficial sites will vanish as the plot will eventually be sold and developed.

Additionally, practices related to storm preparedness, enacted before, during, and after a storm, form an integral aspect of the disaster culture. These practices, adopted as a direct outcome of the 1988 event, reflect the shift from a relatively calm period to the recognition of storms as recurring natural hazards. Negative outcomes included substantial property loss and the displacement or severe damage of 30–40 families' residences. Positive outcomes manifested in a proactive adaptive response strategy, leading to enhanced structural resilience and preparedness measures such as window protections and the secure fastening of objects around houses.

Emergency response efforts have shifted focus, with increased assistance related to storms, leading to the provision of specialized equipment at the local fire stations tailored to storm-related interventions. Emergency responders affiliated with storm-related events report a noteworthy shift in their operational focus, with assistance related to storms surpassing that for fire-related events. The adaptation is evident in the reorientation of the main equipment available at local fire stations, where the inventory now includes resources specifically tailored to storm-related events, such as harnesses and fishing nets for securing roofs and materials for fixing damaged windows. This contrasts with the pre-1988 scenario when such specialized equipment was not part of the emergency response infrastructure. Consequently, a prevailing perception of safety can be identified within the communities, rooted in the belief that these reinforced structures are capable of withstanding adverse weather conditions.

Floods in Denmark (1872)

In the Danish case, explorative observations and semi-structured interviews were applied in combination with a workshop about flood risk with participants from three small Danish islands. The islands are located close to each other along the southern coast of Funen. Further details about the applied approach can be found in Baron and Kongsager (2024).

From November 12th to 13th in 1872, an extreme coastal flood event occurred in the south Baltic Sea. First, strong westerly winds pushed large volumes of water into the Baltic Sea, changing to strong northeasterly to easterly winds, reaching hurricane strength in the south Baltic Sea. This unusual combination of winds created a storm surge

reaching up to 3.5 m above mean sea level along the northern coast of Germany and the southern coast of Denmark and Sweden. People both on land and at sea were taken by surprise by the storm. In 1872, there were no operational storm warning systems that were able to predict the storm and warn the public. In Denmark and Germany, 271 people died: 99 on land in Denmark, 63 on land in Germany, and 109 at sea. The three islands in this case (Birkholm, Skarø, and Drejø) were also hit by this storm surge. In this area, the sea rose to approximately 3 m above mean sea level. The island of Birkholm was completely flooded, and all houses were either destroyed or damaged. On Drejø, the houses close to the old harbor were flooded, but the main village of the island was not, since it is located on much higher ground. On Skarø, it is difficult to find any exact recordings/stories of the flooded area, but an examination of maps and sea levels shows that several of the old houses in the villages were flooded. There are no records of people losing their lives on the three islands.

The 1872 flood is the most damaging natural event along the inner Danish coasts in recorded history, and today it exists both in the cultural and communicative memory in Denmark. Several written records of the flood exist (Friis 1926; Hansen 1879), and there are several memorials. Also, the sea levels of the 1872 flood are used as reference points in national flood risk assessments, and the flood is therefore well remembered among experts carrying out risk assessments as well as public officials working with flood protection projects and planning.

When interviewing people in areas affected by the 1872 flood, several interviewees mentioned the flood and gave examples of how their local areas were affected. However, the storm surge occurred 150 years ago and therefore no living memory exists. The case shows a large variation in the collective memory of the event both across the three case communities studied and over time.

Birkholm was the island that was worst affected by the 1872 flood and is also the community where the flood event is remembered best. All interviewees mention the flood and one of the old houses has a marking in a door frame showing the sea level. They talk about the 1872 flood as an illustration of the present flood risk and are worried that the dikes built as a response to the 1872 flood are in lack of repair and may not be able to withstand a similar flood. Here, the flood is connected to their place attachment in the sense that they worry that a similar flood may make it impossible to remain living on the island. In the first part of data collection, only very few participants on Skarø and Drejø mentioned the flood in 1872 when interviewed about local flood risk, even though they live in houses that most likely were flooded. Here, a clear disaster gap existed, and the flood had at that point disappeared from the collective memory. On both Drejø and Skarø, the 1872 flood was mentioned

solely as a historic event, and one that was not likely to happen again. However, in October 2023, the area of the three islands was hit by a storm surge, not as damaging as the one back in 1872 but still the most damaging flood event any of the people living on the islands have ever experienced. This flood was a result of the same type of weather pattern as in 1872. This time, the sea rose to 2 m above the normal level around the islands and led to severe damage to both properties and infrastructure. After this event, the 1872 flood has been re-remembered. Now, most people on the island know about it, where the water went at that time, and discuss the possibility of experiencing a similar disaster again.

Flash floods in Norway (1873 and 2013)

The Norwegian case study employed a mixed-methods narrative approach, collecting data through document analysis combined with exploratory observations and interviews performed during a field visit in September 2022. Further details about the applied approach can be found in Lie et al. (2023).

The case communities (Barstadvik and Vartdal) are prone to flash floods due to topography and location. The occurrence of several flash flood events with cascading consequences such as flood- and landslides are found in historical data as well as in the realm of lived experience. “Storevassflødet,” the great flash flood of 1873, exceeded any flash flood previously experienced, causing one fatality and damaging housing, infrastructure, and agricultural livelihoods. In 2013, a flash flood event triggering a large flood slide resulted in damage to housing and infrastructure. Exposed residents had to be temporarily evacuated out of the area.

An interplay between cultural and communicative memory shaped by these two events in 1873 and 2013 is evident. The great flood of 1873, constituting a form of cultural memory, is actively preserved through a memorial monument and visual protective structures and is passively remembered in written documents. Stories from eyewitnesses were collected in the aftermath of the 1873 event and eventually published in local history books, translating the communicative memory into a cultural memory. This documentation has since been made accessible to the public in a digital format through the Norwegian National Library.

Recovering from the great flood of 1873, and following a national investigation of the disaster, flood protection measures were implemented as a joint effort between the government and the local community. The remaining monies after completion of the measures were allocated to a fund for future flood damages. The flood protection embankment, finalized in 1877, was one of the earliest flood protection measures recorded in Norway. Residents still point out the

old embankment today when discussing flood protection measures, indicating the presence of a functional memory within the community.

The flash flood event in 2013 embodies communicative and lived memory, actively recalled through a visible scar in the landscape and a remaining flagpole marking the site of a former dwelling. In the context of the 2013 flash flood, attitudes toward discussing the event varied among locals, with some willingly engaging in dialogue about its implications while others wanted to suppress distressing memories.

Collective memory is pronounced among individuals with family connections and long residency in the region. Memories exist in tangible forms, such as published books, and are complemented by intangible oral histories. People still reside in risk-prone communities despite a long history of flooding events, and relocation is generally not considered an option. The 1873 flood led to several residents having to relocate within the community—although this solution was not long-lasting, since they chose to re-settle in the impacted area within a year. Relocation was also strongly opposed by the participants in the recent case study, identifying narratives of place attachment in the form of place dependence, place identity, family bonding, and affinity to nature as the main reasons. Place dependence manifesting through generational farming activities and a collective history of flooding events and how these have impacted the residents' livelihoods emerged as a salient factor influencing risk perception, integrating historical awareness of events such as the 1873 flood with more recent occurrences such as the 2013 flash flood.

With a long-standing history of flooding events, the perpetual presence of a disaster may have contributed to the development of a form of “disaster culture” within these communities. Instances were identified where lived experiences fostered heightened awareness of potential risks, prompting proactive measures at the individual level, characterized by a focus on self-preparedness alongside heightened awareness of meteorological indicators signaling increased risk. These individual processes appear to be based on lived experience but also to some extent on a collective memory of past events, which becomes visible when residents who have not experienced the events still engage in precautionary measures. The visible consequences of the 2013 flash flood in the form of a scarred landscape may also provide a way of promoting risk awareness within the community. Conversely, some inhabitants exhibited a perceived underestimation of the risk, despite observable threats in proximity, or a form of resignation, stating that there was not much to be done about the forces of nature. In these cases, the visible scar in the landscape following the 2013 flood did not serve as a predictor of behavior to reduce future risk.

Avalanches in Iceland (1995)

The Icelandic case applied focus group interviews, scenario-building exercises, and individual interviews with residents, including walking interviews and photovoice, as well as expert interviews (Kokorsch and Gísladóttir 2023; Lyons et al. 2024; Simmons et al. 2024).

In Iceland, an interesting case unfolds that intertwines individual memories with the broader social context. Two avalanches hit villages in the Westfjords in Iceland in 1995, claiming the lives of 20 individuals in Flateyri and 14 in Suðavík. These two avalanches can be considered the turning points in Icelandic disaster risk management with regard to avalanches. Flateyri serves as the focal point of this case study, and it is noteworthy that another avalanche occurred in 2020, resulting in no casualties due to the implementation of an avalanche barrier constructed in the aftermath of the 1995 event.

Considering the forms of memory, various forms manifest, including communicative and cultural memory embedded in the community, both tangibly and intangibly. Eyewitnesses of the event still live in the village, share their memories, and are an integral part of the lived memory, while cultural memory in the form of physical records is simultaneously in the making. Avalanches are also an informal part of the curriculum in the local elementary school. Additionally, the visible avalanche barrier and a centrally located memorial stone by the church serve as daily reminders, at least subconsciously.

In this case, remembering and behavior are linked to the physical location of the memory: It is part of the communicative memory within a community. The conception of place attachment—here the emotional connection to a place—and the visible bearer of memories, has an impact on the perception of risk and thus risk-related behavior. The visual signs of threat, or the exact opposite of it—here a barrier that is visible from each point in town—play a powerful role in protective behavior, steering away from false beliefs of security, and act as constant reminders, particularly when traversing vulnerable areas outside of town.

With communicative and cultural memory as a foundation, the study revealed collective memory in the village, which is mainly based on social interaction, artifacts, and text. The 1995 avalanche emerges as a fundamental component of the local identity, strengthening the community's sense of cohesion and social aspects of place attachment. While it is important for the local community to keep the memory alive, we also found critical voices that expressed concerns about stigmatization from people outside the community.

In addition, memories wield a dual role in the village: They serve as a means for locals to navigate trauma in the aftermath of the 1995 event and emerge as an integral

component of community narratives. The potential for conflicts heightened after the 2020 avalanche, with memories being less contested due to the absence of casualties. Nonetheless, the addition of a memorial displaying photographs of the harbor area affected by the avalanche becomes an integral part of the commemorative landscape. Additionally, organized tours for tourists contribute to the memory experience. According to locals, the form of remembering would have been different if there had been casualties. Memories are subject to interpretation and manipulation based on the prevailing societal norms and interests. In the case of the avalanches of the winter of 1995 in Iceland, an interesting shift was observed: Societal norms and interests were based on these two events, with a review of existing norms and protocols with regard to avalanche risk management. The community aligns with the concept of a “culture of disaster,” where disaster management, preventive measures, and institutions arise from repeated experiences of disasters, solidified by a recurring cultural memory. However, the threat of fatigue and feelings of stigmatization should not be underestimated in such a culture, and indeed some responses allow for such interpretation. Nonetheless, most interviewees underscore the importance of knowledge and memory sharing, fostering increased local interest and understanding of the associated risks.

Wildfires in Sweden (1983)

The Swedish case applied a narrative approach based on individual semi-structured interviews and documents. Further details about the applied approach can be found in Eriksson et al. (2024).

The area for the Swedish case study has a history of several, but often spatially limited, wildfires of low consequence. There is one fire that stands out, and that is the wildfire in Bohult in 1983, which many of the interviewees mention. This wildfire was the largest in Sweden at the time. The fire was caused by a train generating sparks that landed in the dry vegetation alongside the tracks, leading to a 9-km line of ignition. In the end, the fire covered 630 hectares. Already during the first evening, 500 men worked to extinguish the fire. The fire was initiated on August 16, and it took 3 days before the fire borders were secured. However, the emergency response effort continued for at least 2 weeks, and smoldering continued in the area until the end of September. Several properties in the area were threatened or destroyed, and homeowners witnessed how the wildfire approached their homes, igniting the garden vegetation and the litter in the house’s gutters. Several volunteered to help extinguish the fire, among them home- and landowners as well as farmers.

Various forms of memories manifest when talking about the 1983 Bohult wildfire. When it comes to cultural memory,

descriptions of it can be found in newspaper reports. There are also more recent articles where firemen who were involved in the response to it comment on ongoing fires. In addition, shortly after this event, a fire forest reserve was created, since the event was regarded as a unique opportunity to study how nature recovers after a wildfire. Therefore, a 65-hectare area was set aside as a nature reserve. However, this reserve was not mentioned in the interviews.

There is also a clear communicative memory. In the interviews, eyewitnesses describe their memories of the situation. These are either childhood memories of their fathers or uncles fighting the fire, but also their own memories of involvement in the response. The interviewees tell stories of a community that supports each other when needed and where there is a strong place attachment. From the memories, it is also clear that the studied area naturally has a relatively high fire frequency and that the interviewees live in an area where wildfires (at least smaller ones) are common. Besides talking about the 1983 event, the interviewees recounted histories of smaller wildfires and the most recent wildfire in 2021, which developed into the largest in Sweden during that year. The Bohult fire in 1983 was not the first fire of its kind in the area. Historic records of large fires exist for both 1868 and 1947, and peat layer investigations show that the fire frequency has been high for the past couple of thousand years (Granström and Ehnström 1990). However, this is not something that is discussed to any great extent during the interviews, more than that wildfires are common in the area.

The interviewees’ memories of previous wildfires, apart from perhaps the large fire of 1983, describe fires that the society managed to deal with. The dominating narrative presented is that the local fire and rescue service, together with the local community, are well prepared to respond to this type of event. Wildfires are described as nothing to worry too much about. This in turn seems to result in that the residents do not see the need to develop their individual capacity for these types of events; instead, fires are solved by the fire and rescue service (and forest owners). Separated from those who live in the area, the local fire and rescue services describe the increasing problems with droughts and wildfires in the area as something that they focus on developing capacity for. For the fire and rescue services, however, it is not only the memories of the many fires in their area but also their concern based on the large Swedish wildfires in 2014 and 2018 (which affected other parts of Sweden). These events have influenced legislation and changed how the fire and rescue services are organized and work throughout Sweden.

Summary

The following table (Table 1) summarizes the main forms of memory, taking into account the interplay of place

attachment and memory as well as memory and its effects on risk management.

Discussion

The five case studies reveal complex interactions between memory forms, place attachment, risk perception, and capacity building in the face of natural hazards, which will be elaborated on in the following sections.

The dynamics of memory and forgetting

Comparing the five cases, we have not found systematic differences regarding the nature of the hazards, or casualties in connection to the formation of memories, place attachment, or risk perception. In most cases, certain demographics or events fall outside the collective memory. This is particularly evident in communities where memories of past disasters have faded or where newer generations lack direct experiences of such events and thus a potential disaster gap may have occurred (cf. Schenk 2015; cf. Walshe et al. 2020). The absence of formal commemoration for the 1988 storm on the Faroe Islands underscores how certain events, while impactful, may not be memorialized in a manner that ensures their transmission across generations. This experience, and thereby the memories, will erode within one or two generations. The importance of transmission over generations (Lejano et al. 2021) was illustrated well in the Faroese and Icelandic cases, where severe events followed decades of perceived safety due to the low frequency of hazards, resulting in a lack of knowledge transmission.

Forgetting, both active and passive, plays a crucial role in shaping risk perceptions and community responses to hazards (Monteil et al. 2020). Active forgetting is observed in communities that choose to downplay the severity of hazards as part of their cultural identity, as seen in several of the cases—for instance, on the Faroe Islands, where storms are considered a part of everyday life. Passive forgetting occurs through the generational erosion of memories, notably in Denmark and Sweden, where historical events like the 1872 flood and the 1983 wildfire become distant anecdotes rather than urgent warnings.

Access to memory

Access to memory, facilitated by libraries or digital archives, as in Norway, is crucial for bridging the gap between lived experiences and historical records (cf. McEwen et al. 2017). This also touches upon the discussion regarding functional and storage memory (de Guttry and Ratter 2022). However, the efficacy of these records in influencing behavior and policy highlights the complex interplay between accessible

memory and active engagement with the past. This was also illustrated in the Faroese case since the memory is omnipresent for those having parents/grandparents who experienced the 1988 event and are willing to talk about it but even more importantly find a younger generation that is interested in listening. The latter may be the challenge. Memory is enclosed, or hidden, for those without family ties to the event, since there are few noticeable “scars,” and no markings such as memorials. Thus, to find official and less subjective information (compared to the oral stories) about this event, people have to actively search for it—online and physically in libraries and archives—and information is far from compiled.

Stigmatization

Stigmatization emerges as a consequence of how disasters are remembered and forgotten. Communities affected by disasters may be stigmatized based on their ascribed and perceived vulnerability or historical experiences, as seen in Norway and Iceland. The West Coast of Norway has a reputation for being weather-exposed and prone to land/rockslides and flash floods, a perception commonly held by both insiders originating from the region and those who had relocated from outside. This impression can lead to a form of stigmatization of the area, which some of the residents deal with through either resignation or active steps to ensure self-preparedness, forming a sense of disaster culture. The occurrence and remembrance of disastrous events such as those of 1873 and 2013 may contribute to reinforcing this negative impression. A similar observation was made for Iceland and the avalanches in 1995 and 2020.

Memory, risk perception, and capacity building

The integration of collective, cultural, and communicative memories into risk management practices is evident across the case studies. Across the cases, memory acts as a double-edged sword. In communities where disasters have established a strong collective memory, such as the Faroe Islands’ storm of 1988 and Iceland’s avalanches in 1995, there is a heightened awareness and adoption of preventive measures. These measures range from structural adaptations, like the avalanche barriers in Iceland, to community-engaged practices of storm preparedness in the Faroe Islands. The active remembrance of past events, facilitated through oral storytelling and physical memorials, cultivates a culture of preparedness (cf. Kempe 2007; Martinez et al. 2020). The Norwegian case is somewhat similar and illustrates how collective memory can serve as a tool to support sense-making when living with the perpetual presence of natural hazard risk, influencing residents’ behavior in terms of risk management and capacity building. For many locals, this manifested in an improved capacity of self-preparedness, while

Table 1 Summary of key findings in the five case study sites regarding the form of memory, memory, and place attachments, as well as memory and risk management

Case and event	Form of memory	Memory and place attachment	Memory and risk management
Faeroe Islands. Storm 1988	Communicative and collective memory through oral transmission, which mainly are storytelling about the event from eyewitnesses to the next generation.	Collective memory about safe/unsafe locations during storms, which are based on the storytelling.	Risk-related behavior linked to communicative memory within community, but also “disaster culture” promoting awareness of risk and self-preparedness. No disaster gap identified.
Denmark. Storm surges 1872	Cultural memory	An integral part of local history in both written and oral accounts. Variation in understanding of the connection between the event in cultural memory and present place attachment.	Until recently a clear disaster gap was identified and little disaster culture existed: Local risk perceptions are influenced by present experiences with the same risk (latest flooding event 2023).
Norway. Flash flood 1873/Flash flood and flood slide 2013	Cultural and communicative memory	Collective memory is linked to familial connection and place dependency.	“Disaster culture” promotes awareness of risk and self-preparedness, but also evidence of underestimation of risk.
Iceland. Avalanche 1995	Mainly communicative (eyewitness) and collective memory. Little institutionalized memory. Functional memory (barrier and memorial) and storage memory (book)	An integral part of the local narrative and latent culture of disaster; yet fear of stigmatization. Shared memory as a factor in the creation of an identity, while simultaneously fighting for a new identity.	Risk-related behavior linked to communicative memory within the community. Memory not ceasing due to continuous avalanche risk and further improvement to the barrier (functional memory). No disaster gap was identified.
Sweden. Wildfires 1983	A mix of cultural memory (records and storage memory), communicative memory (eyewitness and oral transmission), and collective memory (shared narrative)	Eyewitnesses recount shared experiences of the 1983 fire, indicating strong community ties and place attachment.	Community narratives downplay wildfire risks, placing responsibility on fire services; risk not prioritized by locals. Local fire services actively focus on increasing risks and preparedness, driven by memories of past large-scale wildfires.

for others it led to the downplaying of risk or resignation (cf. Lie et al. 2023).

Our studies also identify instances where memory contributes to an underestimation of risks. A phenomenon observed in the Swedish case of wildfires, where reliance on external firefighting resources overshadows local capacity building. A similar observation was made on the Faroe Islands, where the 1988 storm is put on a pedestal and seen as a unique outlier in memories. Using this as the worst-case-scenario benchmark will be problematic in a future impacted by climate change where the severity of the storms is expected to increase (cf. Kongsager and Baron 2024) and good examples for the underestimation of risk can be observed (cf. Schenk 2015; cf. Walshe et al. 2020). An interesting observation occurred at the time of writing this paper since the flood of the Danish case has been understood as a historical event, likely not happening again. However, another similar though less damaging storm surge occurred in October 2023. The 1872 flood can be used to illustrate possible flood risk scenarios more convincingly. It is an extreme event; however, it has happened before. The variation in the collective memory on the three Danish islands shows that the collective memory of the 1872 flood

influences risk perceptions and motivation to take preventive measures and thus historical memory is turning into lived memory, shrinking a previous disaster gap (cf. Fanta et al. 2019; Schenk 2015).

Years matter, as they embed disastrous events into the collective memory and provide a way of coping with the risk by learning from past events. Comparing the five cases emphasizes the importance of integrating memory into disaster risk management frameworks. The effectiveness of preventive measures is significantly influenced by how communities remember and internalize past disasters. The findings advocate for a multifaceted approach to memory preservation, encompassing both tangible and intangible means, to ensure the continuity of risk awareness and the adoption of appropriate preventive measures. For future capacity building strategies, the following five suggestions can be taken from the individual cases in connection with results from cases elsewhere.

First, encouraging the establishment of physical memorials and commemorative events that serve both as a tribute to past events and a continuous reminder of the risks (cf. Boret and Shibayama 2018; McEwen et al. 2017). Second, promoting oral history projects and intergenerational dialogues to

facilitate the transfer of knowledge and risk awareness (cf. Lejano et al. 2021; Schenk 2015). Third, incorporating disaster history and memory into local education curricula to instill a culture of preparedness from an early age (cf. Fanta et al. 2019). This can be combined, as a fourth suggestion, with digital platforms to create accessible archives of disaster experiences, ensuring wider dissemination and engagement with both local and broader audiences (cf. McEwen et al. 2017). Five, awareness of conflicting memories could help inform and improve future responses to natural disasters and requires an active dialogue between exposed communities and the local government responsible for emergency preparedness and response (cf. Funtaelba 2021; Monteil et al. 2020).

Conclusion

The research questions posed in this study aim to understand the forms of hazard-related memory within small, remote communities, the influence of memory on place attachment, and the impact of memory on capacity building and risk management. Memory plays a crucial role in shaping communities' responses to and perceptions of risks and different types of natural hazards across the five case study locations.

Memory manifests in several forms, including communicative, cultural, and collective memory. These memories encompass detailed recollections of past events and are maintained through oral histories (Faroe Islands), physical monuments (Iceland and Norway), and practices (all cases). In almost all the cases, memories are not solely about the events themselves but even more about the community's response and adaptation to them.

Memory significantly influences place attachment by contributing to the identity of a place and the self-identification of its inhabitants. Shared memories of disasters and subsequent resilience or recovery efforts strengthen community ties and a sense of belonging. In the Faroe Islands, for example, storms are an integral part of daily life and identity, despite the potential dangers they pose. In Iceland, the avalanches of 1995 have become an important part of the local narrative, enhancing community cohesion. Place attachment is further reinforced by physical reminders, such as memorials in Iceland and Denmark, which serve as constant reminders of past events and the community's resilience.

Memory plays a dual role in capacity building and risk management, serving both as a guide for future preparedness and a reflection of past experiences. In Norway and Sweden, memories of floods and wildfires, respectively, have led to improved disaster response strategies and a heightened awareness of risks among residents. However, there is also evidence of a *disaster gap* where the collective memory of past events fades, leading to underestimation of risks, as

seen on some of the Danish islands regarding the 1872 flood and to a lesser extent in the Icelandic and Faroese cases. Furthermore, the incorporation of disaster memories into local culture, as observed in the Icelandic and Norwegian cases, can foster a *culture of disaster* where preparedness and resilience become ingrained in the community's identity.

In conclusion, the study reveals that hazard-related memory, in its various forms, plays a critical role in shaping communities' responses to natural disasters. It influences place attachment by contributing to the collective identity and resilience of communities. Memory also impacts capacity building and risk management by informing preparedness strategies. However, the fading of memory over time poses challenges to maintaining a continuous state of preparedness and risk awareness. Therefore, actively preserving and revitalizing these memories, through both tangible and intangible means, are essential for enhancing communities' resilience to future hazards.

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Declarations

Conflict of interest The authors declare no competing interests.

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