

**Flooding Memorials in the Northern Front Range of Colorado: Hazard Memorialization
and the Human – Environment Relationship**

By
Zoe Jane Boiarsky
University of Colorado Boulder

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Thesis advisors:

Abby Hickcox, Arts and Sciences Honors Program, primary thesis advisor
Heide Bruckner, Geography Department, Honors Council representative
Lori Peek, Sociology Department, committee member

ABSTRACT

This thesis critically examines how natural hazard memorials, specifically memorials memorializing flooding events, represent and display our human-environment interactions. The thesis begins by presenting information about four broad sets of categories used to classify and understand memorials. These four broad categories are then applied to the case study of flood memorials in the Northern Front Range of Colorado. The resulting information is used to develop and propose a new set of categories that specifically focuses on how natural hazard memorials portray the human role in natural disasters. Ultimately, this thesis proposes a set of three new categories: memorials that treat hazards as purely natural, memorials that portray hazards as a human-environment hybrid event, and memorials that present hazards as an anthropogenic event. This pattern demonstrates current trends in the way communities are presenting information on natural hazards through memorialization, which gives us a glimpse into larger trends regarding mitigation and recovery from extreme events.

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INTRODUCTION

Beginning at birth, people are exposed to different types of experiences, both good and bad. These events can be experienced on an individual level or a group level. Some of these events are especially traumatic, leaving lasting effects. The effects can manifest on a physical level, through bodily harm, on a fiscal level, through the loss of money or property, or on an emotional level, through post-traumatic stress.

Everyone copes with these effects in different ways. Communities, in particular, have patterns in the way they face and recover from these extreme events. One of the principal ways communities respond to extreme events is through memorialization. People create physical reminders of what happened to them and embed them in the landscape. Memorials also serve future generations. They influence how people remember and understand the past (Dwyer & Alderman, 2008). This remembrance can be seen on the cultural landscape through monuments, street signs, water markers, and memorials. Memorialization and commemoration are well-documented and well-studied areas in cultural geography. Research has shown there are distinct patterns in the way people commemorate events. In general, events that are memorialized show that a community deems them meaningful or valuable.

A variety of research has focused on identifying the patterns of memorialization and commemoration, such as categorizing sites into different groups based on how the site narrates the event being memorialized. Scholars have also studied different types of memorials. The main focus of the research has been on events marking major human events, such as war, massacres, and terrorist attacks (Foote, 1997). Less research has been done on memorials commemorating events where the environment affects people, such as natural disasters like flash floods. Yet,

memorials are a significant part of communities' process in recovering from these hazard experiences.

This thesis will focus on memorials marking natural disaster events. It is important to study these extreme events and communities' actions surrounding the event because it allows us to further understand the ways in which communities react to natural hazards and prepare for future events. The thesis begins by reviewing previously identified patterns of commemorations. It will then apply these patterns to a case study of ten memorials to see if these patterns are found. These ten memorials are located in the Northern Front Range of Colorado. The selected memorials all commemorate different flooding events that have occurred over the last 50 years. By focusing on a specific natural hazard in a specific area, this paper hopes to gain a deeper understanding of the role natural hazard memorials play in representing and displaying our human-environment interactions.

In the process of analyzing the ten flooding memorials with existing categories of memorialization, I found that there is a lack of information and study in the area of natural hazards memorialization. This thesis seeks to fill that gap by proposing a new categorization of memorialization that examines the recognition of the human role in natural hazards through a political ecology approach. This new categorization consists of three groups: memorials that treat hazards as purely natural, a human-environment hybrid event, and an anthropogenic event. In this new classification, the memorials within the case study are split six to four between presenting natural hazards as natural events and natural hazards human-environment hybrid events. This pattern demonstrates current trends in the way communities are presenting information on natural hazards, which gives us a glimpse into larger trends regarding mitigation and recovery from extreme events.

LITERATURE REVIEW: CATEGORIZING AND ANALYZING MEMORIALS

This section will present four broad approaches to classifying all types of memorials, including natural hazard memorials. These four broad categories will later be applied to the case study of flooding memorials. Before this paper presents the different patterns and categories proposed by researchers within the field of cultural geography, it will present a broader overview of commemorations and memorialization. This will help solidify the reader's understanding of the primarily agreed-upon elements and the potential of memorials to shape public memory.

First, it is helpful to distinguish between memorials and monuments. Monuments commemorate events or people characterized by triumph. Memorials commemorate events or people characterized by loss (Dwyer & Alderman, 2008). This paper focuses on memorials but some of the patterns and categories presented by scholars are applicable to both.

A memorial's main purpose is to be symbolic (Foote & Azaryahu, 2007). Memorials are viewed as public symbols and as a part of the greater cultural landscape. They reveal the social order of a community, acting as physical manifestations of what communities and groups deem worthy of remembering when a loss is experienced. The narratives presented at these sites often reflect those in power and are "likely to support, not challenge, mainstream democratic values" (Dubriwny & Poirot, 2017, p. 199). But these sites can also challenge the people in power, presenting different narratives of an event or entirely suspending the symbolic system of power while viewers interact with the memorials (Olsen, 2019).

Memorials are also sites of identity. Geographers Waldemar Cudny and Hakan Appelblad argue a memorial is a "symbolic landscape representing history and identity, and values related

to them” (2019, p. 275). Memorials serve as tangible and familiar connections to the past, making the history or event they commemorate appear close and relevant. As a result, many scholars, like Shanti Sumartojo, assert that commemoration is “implicitly concerned with futurity” (2021, p. 532). These sites reproduce ideas about the past and consequently reinforce group identity in the future. In this way, memorials serve as a form of social and cultural reproduction (Cheng, 2014).

The following sections will present four broad approaches to categorizing all types of memorials, including natural hazard memorials. These broad approaches do not focus on a specific type of memorial but rather focus on the practice of memorializing events, and how those practices can be categorized. This literature review forms the foundation for the analysis of the case study of ten flooding memorials. Later in the thesis, each of the ten sites will be analyzed using the categories presented below.

After presenting the four approaches, the final sub-section of the literature review draws on political ecology’s approach to natural hazards to present and discuss research that has focused on natural hazards memorials. It will be followed by a critique of the work. Finally, the section will conclude with the proposal for a specific natural hazards memorial categorization. These proposed categories will in turn complement the other four broad approaches to categorizing memorials; it focuses on the role of recognition of the human role in hazard events in the practice of natural disaster memorialization.

Sanctification, Designation, Rectification, and Obliteration

The first of categories is proposed by American Geographer, Kenneth Foote, in his book *Shadowed Ground: America's Landscapes of Violence and Tragedy*. Foote proposes that memorial sites fall into one of four categories: sanctification, designation, rectification, and obliteration (Foote, 1997). These categories emerged from Foote's studies of the memorialization of tragedy from political and social turmoil, war and battles, and massacres and uprisings. Foote's research is influential and at the forefront of memorial studies. Foote's categorization focuses on the different processes of making or erasing meaning at memorial sites in relation to the memorialized events.

The first category, *sanctification*, is on one side of the continuum the four categories create. Sanctification occurs when "events are seen to hold some lasting positive meaning that people wish to remember" (Foote, 1997, p. 7). A sacred place is created, such as memorials and monuments, as a result of sanctification. Typically, a durable marker or memorial is placed on the site marking the public importance. The memorial or marker that is erected is typically commemorated through a ceremony stating the site's specific significance. Foote argues the sanctification category most clearly exemplifies the relationship between memory and landscape. For a site to be in the sanctification category it must undergo some ritual of consecration. The places are then transformed into symbols, reminders, and warnings for future generations (Foote, 1997).

Sanctified sites have five characteristics. First, these sites are distinct and stand out. They are bound by their surroundings and clearly mark what occurred. Second, care is put into the sites, and they are typically maintained for long periods of time. Third, a change of ownership is involved, typically from private to public ownership. Fourth, people are attracted to the sites.

This attraction may be for historical reenactments, memorial services, or pilgrimages. Finally, the sites tend to attract more memorials and commemoration. They act as the focus for other related and non-related commemorative efforts (Foote, 1997).

Foote argues sanctification often occurs when communities are struck by natural disasters. Sanctification, he argues, is “a natural response to the grief of community loss” and that the creation of memorials “both honors the victims of the disaster and helps the community to mourn” (Foote, 1997, p. 15). The memorial represents a community effort to recognize the loss. Foote argues that sanctification commonly occurs within the context of natural disasters when the disaster struck a homogeneous population, allowing members to easily decide to memorialize their loss. Ultimately, sanctified sites are set apart and given special attention in order to memorialize the tragic event.

The next category, *designation*, is similar to sanctification. The site is also marked for its importance. But there is an omission of rituals of consecration. As Foote says, “designated sites are marked but not sanctified” (Foote, 1997, p. 16). These events are important but lack the heroic or sacrificial qualities that sanctified sites have. Foote argues that while these sites are markers of important history or events, they do not receive long-term attention. These sites are also not places of rituals or pilgrimages. A key distinction between sanctified versus designated sites is “designated places are unveiled rather than dedicated” (Foote, 1997, p. 18). But the categorization of a site as designated can change. A designated site can be a transitional place where sanctification or obliteration can later occur.

Rectification is the next category on the spectrum. Rectification is “the process through which a tragedy site is put right and used again” (Foote, 1997, p. 23). The sites in this category

are not known or held in public memory for very long after the tragedy. The association or connection between the site and event weakens over time, and the site transitions back to a site of daily life. After the event or tragedy has occurred, some clean-up of any visual evidence is done but then the site is left alone. Commonly the site is abandoned, and occasionally it is repurposed. Foote argues rectification occurs in the majority of sites involving tragedy and violence.

On the other end of the continuum is *obliteration*, which results from “particularly shameful events people would prefer to forget” (Foote, 1997, p. 7). Obliteration is the opposite of sanctification. Unlike sanctification, all evidence of this event is destroyed and erased. Typically, the site is removed from use. Eventually, it may serve a use again but not until a long period of time has passed and the new use is radically different from the original. In his study of sites marked by tragedy, Foote notes that obliterated sites often stick out as much as sanctified or sacred sites. These sites create contrast, having noticeable differences from the surrounding areas. Obliteration is an active spatial practice of forgetting an event.

On the whole, Foote’s continuum categorizes memorials based on their portrayal of and meaning ascribed to violent and tragic events. This categorization focuses on the memorial’s interaction with the physical and memorial environments, in relation to the historical event. Ultimately, the four categories—sanctification, designation, rectification, and obliteration—are viewed as possible outcomes of major modifications made to the landscape. Foote’s classification analyzes how communities process and cope with tragic and violent events through different forms of memorialization.

Text, Arena, Performance

The next broad set of categories comes from Geographers Owen Dwyer and Derek Alderman. In their paper, “Memorial Landscapes: Analytic Questions and Metaphors,” they propose three conceptual lenses or metaphors for understanding and analyzing memorials: memorial landscapes as text, as arena, and as performance. Through these categories, they wish to investigate further into “the important role that space plays in the process and politics of collective memory” (Dwyer & Alderman, 2008, p. 165). This framework emphasizes the ways memorials shape the spaces they occupy and how people interact with them.

The first category, memorials as text centers on how the past is framed. Memorials are viewed as an addition to the landscape or symbolic system. These sites are written and read in, and at times erased from, society. This writing and reading is done by “authors” and “readers” who have their own socio-spatial context. The text metaphor gives recognition that while the memorials are authored initially by one person or a group, they may be interpreted by a variety of other people. Because of this, Dwyer and Alderman argue that meaning is “produced intertextually and recursively in and through discursive social order” (2008, p. 165). This approach is a dominant model for analyzing memorials and their landscapes.

The textual approach understands that commemoration is a process for displaying stories on and through a landscape. It also argues that memorials undergo what is called symbolic accretion, which describes “the appending of commemorative elements onto already existing memorials” (Dwyer, 2004, p. 419). This accretion causes different meanings to be layered onto the memorials, which fundamentally challenges the idea that memorials are public symbols that have a correct or final meaning. Ultimately this approach utilizes a series of

questions about the characteristics of memorials to understand which historical narratives and discourses are being represented and given authority.

An example of a memorial landscape as text can be seen in a memorial, the Liberty Monument in New Orleans. It was created in 1891 to memorialize the White League, an organization that sought to disenfranchise African Americans in the reconstruction era (Dwyer & Alderman, 2008). This monument has since been removed due to the demand from civil rights activists who argued the monument celebrated illegal action and was offensive to the community. Here we see the different “authors” and “readers” within the monument. Memorials within this category place meaning on the physical sites by providing a guide through which visitors read how a memorialized event is remembered.

In the next category, the *arena* metaphor, memorials are viewed as “arenas” for political struggles and debates over the representation of history through the landscape. It examines the “politicized nature of public memory” (Dwyer & Alderman, 2008, p. 172). The events and narratives that are chosen to be commemorated show the social and political power structures in a given area. Because of this, there can be a conflict between different groups within the community. One way for those in power to stay in power is to erase or quiet those who are in the opposition.

In the metaphor of memorial landscapes as arenas, memorials are viewed as a place for individuals and groups to discuss and debate who has the right to decide what is memorialized and how it will be done. Because of this, memorial landscapes are often susceptible to change. After a large social or political shift, these places may see rapid change where the current group replaces and erases the commemorative sites of the earlier group. Dwyer and Alderman argue

that this pattern is especially true when the event being commemorated involves trauma, atrocity, and violence.

A prime example of memorials or monuments as arena is the Confederate monuments in the United States. Since the election of former President Donald Trump, conflicts over the monuments and their place in the American memorial landscape have arisen (Forest & Johnson, 2019). Some argue the monuments should remain because they are a key part of our national identity and history. Others argue the monuments must go because they uphold racist and discriminatory ideas. Scholars Benjamin Forest and Juliet Johnson point out that consideration must be given to what happens when the monuments leave (2019). They argue that history could be forgotten, and a potential solution is to replace them with a counter-monument. Here we see the monuments acting as the arenas for the conflicts over US Civil War memory to play out. The memorial landscape as an arena is inherently spatial; discussion happens in and around the site, and groups come to the memorial site to protest.

Geographers most often focus on memorials as text or arena, but some have focused on the third category, memorials as *performance*. This metaphor shows how memorials can serve as a stage, both literally and figuratively for social actions. These may be in the form of community rituals, historical re-enactments, marches, civic ceremonies, and festivals. It is not that performances happen in or at these sites but rather the memorial is “constituted, shaped, and made important through the bodily performance and display of collective memories” (Dwyer & Alderman, 2008, p. 173-174).

The authors argue that memorials as performance are important within the tourism industry, particularly the heritage tourism industry. Local communities often focus on how to

engage with and highlight local history. For some memorials, they may become the site or stage for historical re-enactments and tours. These memorials draw people into the symbolic meanings they represent. The creation of memorials as performance is not restricted to actors or tour guides but contains the everyday practice of remembering. For example, an everyday performance of remembering could include visiting the site to clean a memorial brick or bringing flowers to the site.

The metaphor of memorial landscapes as performance also shows how performance can also work to cover or erase certain narratives. For example, in 1996, Bristol, England held the International Festival of the Sea to commemorate its maritime heritage. Organizers intentionally excluded narratives surrounding the city's role in imperialism and slavery. The city also removed underrepresented and impoverished parts of the population during the festival to create a more polished and cultivated experience for tourists (Dwyer & Alderman, 2008). This allowed the organizers to present a succinct and edited version of maritime heritage without any details of violent imperialism. Through performance, memorials confirm, or challenge accepted versions of the collective memory. The design of the memorial fades into the background while the memory is being performed, both literally and figuratively. Memorials here are viewed as dependent on people to voice or ignore their vision of the past.

In summary, Dwyer and Alderman's categories of memorial landscapes as text, arena, and performance present important ideas about the interactions between communities and the memorials within those communities. The categories describe how meaning is created and how different memorials present memories through human interaction with the sites, especially as a spatial process.

Marked, Unmarked, Remembered

The third broad set of categories comes from the Lichtenstein brothers, Andrew and Alex. In their book, *Marked, Unmarked, Remembered*, the Lichtensteins cite Foote's categories (described in the previous section) as a major influence on their own. Because their book highlights the visual nature of event sites, they modified Foote's categories to marked, unmarked, and remembered. These categories explore the question of "how we use landscape and topography to rethink the past" (Lichtenstein & Lichtenstein, 2017). Their book presents photos and short narrative captions of sites of memory. These sites explore the intersection between public remembering and public forgetting at locations of violence and trauma in the United States.

The first category of *marked* groups together sites and memorials that have "received the endorsement of commemoration by local, state, or national authorities" (A. Lichtenstein & Lichtenstein, 2017, p. 11). Sites in this category invite viewers to ask questions about the past and how the memorialized events add to a sense of the heritage of an area. Memorials that attract tourism tend to be marked. An example of this type of memorial is the site of the Sand Creek Massacre in Eads Colorado. During the memorialization process, this site went through the process of being marked. The question of where, specifically, the massacre occurred had to be answered before the commemoration could occur. Sand Creek survivors' descendants and National Park Service workers were brought into the process. Conflict arose between the two groups but after some compromise, an agreement was made, and the site was officially marked.

The next category, *unmarked*, presents sites that "have been neglected, forgotten, and in some cases, deliberately obscured" (A. Lichtenstein & Lichtenstein, 2017, p. 14). As with Foote's category of obliteration, these sites are often places of community shame. Groups of

people want to forget and erase the past. According to the Lichtenstein brothers, a good example of a memorial that is an unmarked site is Cabin Pond, in Southampton County Virginia, where the Nat Turner Rebellion occurred. This site remains unmarked except in primary and secondary sources recounting the event. The physical landscape remains unmarked without signs of commemoration. When a site is placed within this category, it is a signal that communities have the desire to forget what happened.

The third and final category is *remembered*. Remembered groups sites together that have “an individual and collective local effort to commemorate crucial events in the face of official disinterest or denial” (A. Lichtenstein & Lichtenstein, 2017, p. 14). The brothers argue that sites in this section join time with a physical place through the gathering of people to memorialize an event or person. These memorials are in a specific physical space commemorating a specific time in the past.

Camp Pendleton in California is a good example of a memorial in the remembered group. This site is a living memorial, an area with symbols and mementos high on a mountain that represents people’s experiences with armed conflict with a section of the camp unofficially dedicated to fallen soldiers. The memorial officially began when a group of seven members carried a cross made from an old telephone pole up the hill (Alderman & Finkelstein, 2021). Later three of the seven people were killed while serving in the US Armed Forces. While the camp itself has moved on, the area continues to be a place of memorial. New crosses appear each year to remember different people. People have tried to have the crosses removed and the site cleaned but the community protested “stressing that these items are deeply meaningful and carefully chosen” (Alderman & Finkelstein, 2021). The site remains to this day.

In total, the categorization proposed by the Lichtensteins groups memorials together based on community reaction and interaction with the sites. Some sites hold importance within a community or government, remaining marked and remembered. Other sites may be left alone, forgotten, unmarked. Memories are preserved through individual and community interactions or actions of remembrance. The Lichtensteins place an emphasis on visual components in their categorization—marked, unmarked, remembered—offering a specific lens that focuses on how people relate to past events.

Perspectives of Commemoration and Spatial Narratives

The final set of categories was proposed by geographers Maoz Azaryahu and Kenneth Foote. They have identified patterns of how “narratives of history are organized spatially at historical sites and memorial places” (Azaryahu & Foote, 2008, p. 179). Azaryahu and Foote identify three strategies or categories of spatial narratives in memorial sites: memorials that narrate from a single point or place, memorials that narrate in sequential order or chronology, and memorials that are complex temporal sequences over long periods of time. This categorization pairs a spatial lens with a narrative lens.

The first category is one of the most common forms of spatial narrative (Azaryahu & Foote, 2008). These are sites that present the historical narrative from a *single point*. These sites are localized to a single place and often commemorate a single event like a battle or assassination. These single points or places may also take the form of a vista or look-out point, which allows viewers to see across a great area. An example of this type of memorial is the Ludlow massacre memorial which sits on the site where people lost their lives (Azaryahu & Foote, 2008).

The second category contains memorials that present a *linear narrative* or timeline. These sites often include trails and paths with a clear beginning and end. They convey the chronological nature of the event or history being memorialized. Pilgrimages, trails, and routes are often associated or included in this category (Azaryahu & Foote, 2008). For example, the Mormon Trail is an example of a memorial in the form of a trail or route. The trail extends through a large area going through many cities and towns. The trail itself memorializes the span of time and space that Joseph Smith traveled on his way to Utah (Azaryahu & Foote, 2008).

The third category or pattern presented by Azaryahu and Foote, are sites that present *complex sequences*. These sequences are often spread out both over large areas and large periods of time, making them difficult to commemorate. They could be long military campaigns or social and cultural transformations. Frequently when these narratives are memorialized, they must be simplified or shortened. The decision of which physical space to use can be difficult because these stories are not linked to one point or location but multiple.

There are several strategies for commemorating these complex narratives. One is to present the history in a point-to-point narrative. This is similar to the sequential narratives but instead of moving chronologically, it may jump from point to point in no particular order. Another strategy is a thematic narrative. This seeks to both highlight and separate different issues, periods, and perspectives while tying them to a single story. The Women's Rights National Historical Park is a good example of this (Azaryahu & Foote, 2008). Parts of the story are told at different parts along the area, some at houses or meeting places.

Ultimately these categories help us group memorials together to study them. Azaryahu and Foote argue historical sites are connections or tangible links to the past. They are interested

in the spatial configuration of history, that is, the way stories are told in space and what narratives they produce. But not all sites fit into one category. There are memorials that utilize a hybrid strategy. Each site dictates which strategy is best used. Deciding on how the narrative is presented, a critical choice must be made in terms of location, text, and direction (Azaryahu & Foote, 2008). This set of categories emphasizes the importance of historical sites as connections or tangible links to the past, and the ways in which they are presented and narrated are important to understanding these connections.

Hazards and Human-Environment Relationship: The Boiarsky Scale

Natural hazards are not simply “acts of God” but rather a complex relationship between people and extreme weather or other environmental hazard events. As Gilbert White famously said, “Floods are ‘acts of God,’ but flood losses are largely acts of man” (White, 1945). This next subsection will begin by reviewing the political ecology approach to studying natural hazards. It will specifically focus on advances made in understanding the environment-society relationship inherent in natural disasters. Finally, it will end by presenting the proposed natural hazard memorial specific categorization, *Hazards as a Natural Events*, *Hazards as a Human-Environment Hybrid Event*, and *Hazards as a Human Event*.

Political ecologists argue in order to understand what happens during a natural disaster “knowledge of both physical and human processes needs to be brought together” (Castree & Braun, 2001, p. 173). Risk and vulnerability are at the center of hazard studies in this discipline (Perreault et al., 2015). In the context of natural hazards, the human-environment relationship is viewed as the management of constant risks. One can think of hazards as “the negative potential of all things” to affect people’s lives and livelihoods (Robbins, 2014, p. 84). Typically, when it

rains, one concern people have is how the water will affect them. Will the water end a drought, or will it start a flood?

But within the study of natural hazards, there has been some disagreement over the role of human-environment interactions. Some political ecologists argue that “a hazardous relationship is one where a natural element is threatening to humanity and where a ‘natural disaster’ can result” (Castree & Braun, 2001, p. 173). Others state ecological problems are at the center of social and political problems, rather than technical or managerial (Neumann, 2005, p. 12). That is to say, effects from a natural disaster are not manageable without critically examining the underlying political and social problems of society.

Within hazards research, the idea that natural hazards are not a purely natural event started with geographer, Gilbert White. White, the Father of floodplain management, dedicated many years to the study of floods. His dissertation “Human Adjustment to Floods: A Geographical Approach to the Flood Problem in the United States” articulated new ideas on how to address flooding risks. Over his career, White proposed a number of new additions to existing hazard mitigation, arguing public policy “should consider all possible adjustments and take into account the full social costs and benefits incurred by society” (Kates, 2011, p. 9). In his studies, White concluded that “the traditional way of dealing with flood hazards – building more engineered structures – is expensive, irrational, and does little to deal with the underlying, fundamentally *human* problems” (Robbins, 2004, p. 27). White argued that the effects of floods are hybrid events caused by human-environment interaction, not simple effects of environmental extremes happening to people. White focused on how we can learn from past hazard events to improve our readiness for future ones. This approach of learning from past hazards is directly related to natural hazard memorialization.

White's work led to several decades of research into human adjustment to natural hazards. This has led researchers like Robert Kates and Ian Burton to the claim that human development has caused an increasingly hazardous environment (Robbins, 2004). This finding leads to the implication that current economic and political structures increase the risk of hazard events. Geographers Michael Watts and Ben Wisner also focused on the role of humans in exacerbating the effects of natural hazards through political economic changes, especially in the Global South (Perreault et al., 2015; Watts, 2008; 2013). Since White's work, there has been a push for research on planning for and mitigating losses from natural hazards. Research has focused on state and federal involvement, as well as individual actions (Robbins, 2004).

While the area of disaster commemoration for the most part remains unstudied, some have begun to study this important area. In their paper "Patterns of Disaster Commemoration in Long-Term Recovery," authors Elyse Zavar and Ronald Schumann (2019), explore the distinction between event-based and place-based commemoration in the context of memorial text commemorating a disaster. This paper specifically focuses on memorial texts produced during the recovery process rather than sites that are designated memorials. Zavar and Schumann focus on the importance of commemoration in the recovery process.

Event-based memorials "recall the scope and scale of a defining hazard impact" (Zavar & Schumann, 2019, p. 164). They focus on the tangible impacts of the event such as the number of people who died or were injured. They give information on the number of properties destroyed or areas affected. The text included in the memorial often describes a timeline of the event. An example provided by Zavar and Schumann is the historical market on St. Helena Island in South Carolina. It commemorates a hurricane that hit the island in 1893. The text presents information

on the amount of loss experienced by the people, specifically descendants of enslaved people. It also contains information about the relief efforts from volunteers (Zavar & Schumann, 2019).

Place-based memorials “focus attention on the characteristics, history, features, and conditions of a location” (Zavar & Schumann, 2019, p. 164). In this category, disasters are not always the main focus of the memorials. The disaster may serve as the momentum behind remembering the historical context of the place. This serves to refocus the memorial not on the past but rather its role in the present. Zavar and Schumann argue that place-based commemoration acknowledges that disasters may make alterations to the site or landscape, but the place may still hold significant cultural relevance. An example provided of place-based commemoration is a placard that stands at the Celery Fields in Florida. The placard memorializes a major flood that occurred in 1994. Because of the flood, the area was acquired through a publicly funded buyout. But the event is not the focus of the information. Instead, the text focuses on the land’s role as a wildlife refuge and a flood mitigation tool. The focus is placed on mitigation rather than the event itself.

Overall, the authors acknowledge two ways natural hazards memorials present information about the event they are commemorating. Natural hazards memorials and memorial texts are physical representations of past events. An extreme event occurs and often part of the recovery process is to memorialize what happened. These two categories to some extent show the different ways natural hazards are framed acknowledging the different societal approaches to natural hazards and their effects on the recovery process. But this categorization fails to acknowledge the complicated relationship that occurs between people and their environment during a natural hazard. That is to say, this categorization does not recognize the spectrum of how hazard memorials portray the human role in natural disasters. This thesis proposes a new set

of categories that places this relationship at the forefront. This new set of categories argues natural hazards memorials fall into one of three groups: memorials that focus on the events as a solely natural event, a solely human-caused event, or a hybrid human-environment event.

Memorials that fall into the natural hazards as a solely natural event describe the extreme events as out of the control of people. They are depicted as unpredictable, dangerous, and unavoidable events. These sites emphasize the cost and damages of the hazard. This may be displayed through text or images, such as a list of houses lost, properties damaged, and a number of people injured and killed.

Next, sites that present natural hazards as a hybrid human-environment event acknowledge the complicated relationship between people and their environment during a natural hazard. These memorials often include information detailing mitigation efforts that were made before the event and efforts made in response to the event. The sites may also include educational safety information for visitors. Memorials within this category may also include data about the number of fatalities or total cost of damage. However, different from hazards seen as only natural events, this data is accompanied by additional information about safety, mitigation, and/or human role in the hazard (e.g., human occupation of flood zones). This information is often presented through informative plaques and helps reframe the event for visitors, to highlight people's role in exacerbating or mitigating the hazard's effects. Ultimately, memorials in this category revolve around people and their actions at the center of natural hazards. The sites highlight the role people play in mitigating and avoiding the risk that comes with the occupation of an area prone to a natural hazard.

The final category is memorials that present hazards as purely human-caused. They portray hazard events purely or primarily as a result of human action. Memorialized events in this category include but are not limited to industrial fires, nuclear meltdowns, and dam and levee breaks. Memorials within this section are less common but are focused on the actions taken by people. They focus on what happened to cause the event and the effects felt after the event.

In the long run, this specific classification for natural hazard memorials is important. By sorting these memorials into different categories, we begin to see the patterns of how we hold these events in public memory. Looking specifically at how the memorials portray the human-environment relationship shows whether or not communities acknowledge the human part in natural hazards. Lack of acknowledgment has the potential to be extremely powerful or extremely dangerous. Memorials that ignore the human role in natural hazards have the potential to further harm communities already affected by a disaster. When memorials present important information on natural hazard safety and risk management, it empowers communities to act swiftly when the next event strikes. Our memories can affect our future actions.

METHODS

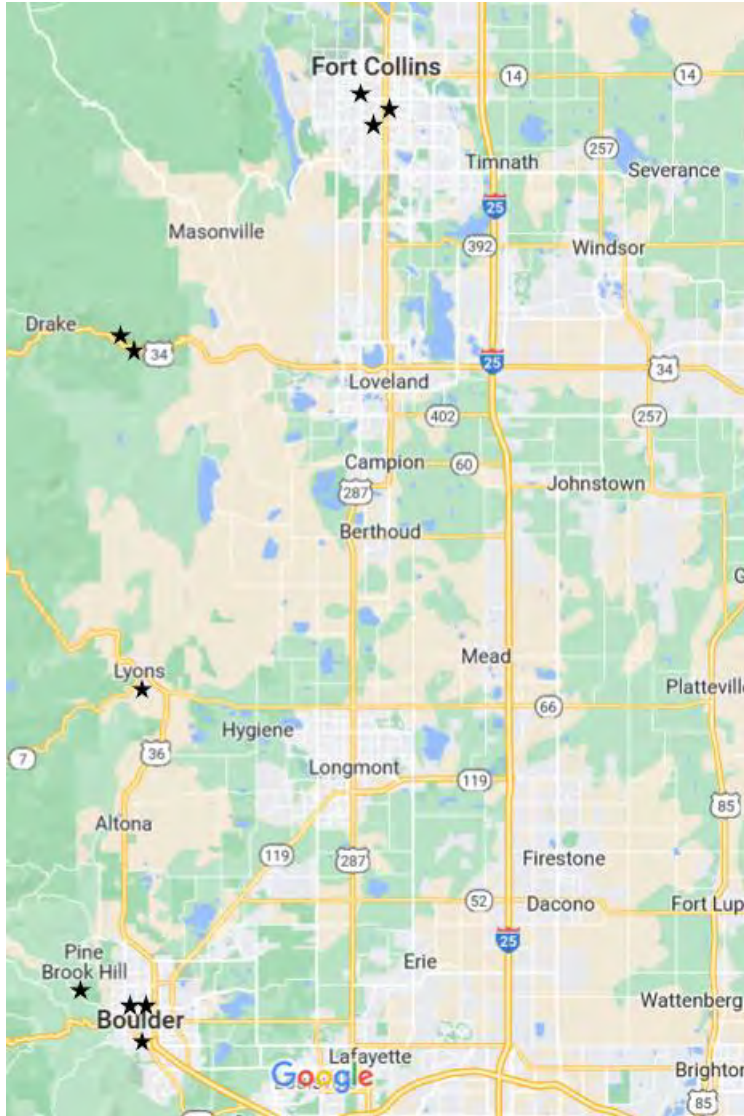


Figure 1. Map of the Northern Colorado Front Range. Stars mark each memorial. Photo Credit: Google Maps

For this thesis, I chose to focus on flood memorials in Colorado's Northern Front Range. I selected ten memorials for my study. Each of the ten memorials commemorates one of three different flooding events, the Big Thompson flood of 1976, the Spring Creek flood of 1997, and the Front Range flood of 2013 (Figure 1). I chose to center this study on flooding in this region due to the frequency of flooding that occurs. This region experiences three different types of floods, flash floods, snowmelt floods, and long-duration low-intensity rainfall that leads to floods

(Jarret & Costa, 2006). From May to October, the potential for floods in this region increases. It is estimated that an average of at least 150 100-year or larger storms affect Colorado each year. Flooding in this area has large effects on the urbanized areas. Due to parking lots, roads, and other nonpermeable surfaces, water from floods is not absorbed and limits the area's ability to

absorb runoff (Langevin & Sullivan, 2015). Because of this, this region has a number of different memorials that commemorate flooding events that have impacted the area.

This region also holds significance in the field of hazards study. The father of floodplain management Gilbert White studied the region, taught at the University of Colorado Boulder, and founded the Natural Hazards Center on campus. White's work in the area holds importance for this field of study because it emphasizes the need to work with the environment. He was a proponent of "adaptation to or accommodation of flood hazards rather than 'structural solutions' (dams and levees)" and is responsible for parts of the flood management adapted along the Boulder Creek (*Natural Hazards Center || Gilbert White, n.d.*).

I found these memorials through word of mouth, talking with friends and family in the area. There is no registry of natural hazard memorials. Because of that, I used Google to search for the sites. I used key words such as: "flooding memorial", "natural hazard memorial", and "water marker" to find images of memorials. From there I gathered information from the websites linked to the photos and found the location of the memorial. After the site was selected, I visited and took pictures and notes. I visited each site between 11 a.m. and 3 p.m. I visited all but one sites in the August of 2021. The How old are you in flood years? mural was visited in March of 2022. I used the photos as a tool to document the memorials and the area surrounding them. The notes I took included information about the features, layout, and structure of the site as well as the ways visitors interacted with the site. I collected data on how many other people were visiting the memorials at the same time. I gave special attention to the way they interacted with the memorial: did they read the signs, did they take pictures, did they talk with other members of their group? These observations supplement the analysis of the memorials but were not collected in a way intended for systematic analysis or comparison between sites. Once the

data was collected from the sites, each site was categorized into the four sets of categories presented in the literature review. Finally, each site was then sorted into the new proposed category.

DATA AND ANALYSIS

Through the analysis of the case study, this thesis seeks to find a deeper understanding regarding the human-environmental relationship and how it is represented in natural hazard memorials. This section will begin by presenting important information about each flooding event that is memorialized by the different sites within the case study. From there, information about each site will be provided along with pictures. Within each site section, the site will be categorized into four sets of categories. Finally, this section will conclude with each site being analyzed using the new proposed scale.

Flood events

1976 Big Thompson Flood

On Saturday, July 31, 1976, a large thunderstorm moved into the sky around Loveland, Colorado. It released up to 7.5 inches of rainfall per hour in the Big Thompson River Basin (Jarret & Costa, 2006). The flood affected the Front Range foothills of the Big Thompson River and the Cache la Poudre River Basin in Larimer County. Towns from Estes Park to Fort Collins suffered from flooding but the area most affected was the Big Thompson Canyon. The Big Thompson River flooded causing destruction all along the canyon. Glen Haven, Glen Comfort, Drake, and Loveland received the brunt of the rainfall (Jarret & Costa, 2006).

Some of those areas received 12 to 14 inches of rain in just under a few hours¹. The Front Range foothills of the Big Thompson River have steep mountainsides with thin soils. Because of this, a large amount of rainfall over a short period of time produced the perfect conditions for a flash flood to occur. The most destructive elements of the flood were the “combination of the sudden rise in river depths, the extremely high floodwater velocities, and the maximum flood depths” (Jarret & Costa, 2006, p. 2). At times, the stream velocities were as fast as 20 to 25 feet per second. The high velocities caused severe erosion along the Big Thompson Canyon, causing large boulders to move downstream. The largest boulder was approximately 12 by 12 by 23 feet and weighed 275 tons (Jarret & Costa, 2006).

The thunderstorm began at night and that, combined with the speed and volume of rainfall, caught residents who lived in the canyon off guard, and the flood caused over 35 million dollars in damages. Four hundred and eighteen structures and 438 automobiles were damaged or lost in the flood. Bridges, roads, power, and telephone lines were damaged. A total of 144 people died, including two first responders who were in the Canyon evacuating people during the event (Jarret & Costa, 2006). Another 250 people were reported injured. More than 800 people were evacuated from the flood zone by helicopter (Jarret & Costa, 2006).

1997 Spring Creek Flood

On July 28, 1997, Fort Collins received the heaviest rains ever recorded in an urban area in Colorado. For six weeks prior to the flood, Fort Collins experienced a period of hot dry weather. Then on July 27th, the first storm came, bringing rain to the area. At the storm’s peak

¹ According to the National Weather Service, a flash flood occurs when flooding begins within 6 hours, often 3 hours, of heavy rainfall. It can be caused by a number of things but most often occurs with heavy rainfall from thunderstorms. Factors such as intensity of rainfall, land use and topography, soil type, and soil water content, determine how quickly a flash flood may occur (US Department of Commerce, n.d.)

about six inches fell in an hour and a half. It is estimated that over a 30-hour period, 10 to 14.5 inches of rain fell on the city. This caused Spring Creek, a tributary of the Cache La Poudre River that flows through part of Fort Collins, to overflow (Langevin & Sullivan, 2015). The creek damaged homes and infrastructure. In Fort Collins, first responders reported trailer homes on fire, explosions at the laundromat, trains derailing, oil in the water, electricity shocking them, and water flooding into homes.

Five people were killed in the flood. Four of those people died in a mobile home park on College Avenue just south of Prospect Road (Langevin & Sullivan, 2015). The fifth occurred close by, just downstream in a residential area. The flood caused over \$20 million in property damage, injured 54 people, and destroyed 200 homes (Langevin & Sullivan, 2015). A lot of damage was also caused to Colorado State University's campus. Over 40 buildings were damaged, including offices and classrooms with personal and professional belongings inside (Langevin & Sullivan, 2015). This included cases of research materials. The library on campus had about 425,00 books damaged. The total cost of damaged property across Fort Collins was more than \$200 million (Udell, 2017).

2013 Front Range Flood

In September of 2013, the Front Range of Colorado, specifically the City of Boulder and much of Boulder County, experienced a 1,000-year rain event and a 100-year flood (Aguilar & Brennan, 2013). The event lasted from September 9 through the 16th. 17.15 inches, close to the average annual rainfall in Boulder, of rain fell over those 8 days. 345 homes and 3 commercial properties were destroyed. 557 homes and 33 commercial properties were damaged (Aguilar & Brennan, 2013). 4 people lost their lives and 1,102 people were evacuated by air and another 707 people were evacuated by road.

Over the course of the eight days, conditions continued to get worse. Roads began to close due to muddy conditions. The University of Colorado Boulder sent the first campus-wide alert on Wednesday the 11th calling for residents to move to higher ground and avoid the Boulder Creek area (Aguilar & Brennan, 2013). Later that night a flash-flood warning was issued for Boulder and parts of the surrounding county. Even later the city of Boulder activated flood sirens near Boulder Creek, which runs through downtown Boulder, urging residents to seek higher ground. Eventually, the university issued a series of evacuation orders (Aguilar & Brennan, 2013). The following days, things continued to get worse. More people were evacuated, and more structures were damaged. People got stuck in the floodwaters, in the mud, and in their houses. On Saturday, September 14th the weather broke, and conditions began to improve. The next day a flash-flood watch was extended but the rainfall lessened as the day progressed.

Other municipalities within Boulder County besides the City of Boulder also suffered massive amounts of damages and in some cases loss of life. In the small mountain town of Jamestown, landslides triggered by rain destroyed homes and buried the town's fire station (Bloom, 2018). Main roads were washed away leaving residents stranded. Many had to be evacuated via helicopter to Boulder. The landslides also caused the death of one resident. James Creek, which runs down the center of the town, overflowed causing \$30 million in damages (Bloom, 2018). After the flood, approximately 90 percent of Jamestown's 300 residents moved away.

Lyons, a small town at the base of the foothills north of Boulder, was also greatly affected by the floods. The St. Vrain Creek, which runs through parts of Lyons, overflowed, destroying two major parks (Bear, 2018) and a manufactured home community. Houses filled with silt and water and one resident, Gerald Boland died. Over 500 people were evacuated. As of

2019, \$75 million had been spent repairing the damages (Bear, 2018). The town has had a long road to recover with many residents opting to sell their land and move out of the town.

Memorials

Big Thompson Flood Memorial

The Big Thompson Flooding memorial is located in the Big Thompson Canyon close to Loveland, Colorado. This was created by sculptor Bradley T. Mullinix. It is located off to the side of the road beside a fire station. The Big Thompson River flows on the other side of the road. This site memorializes the Big Thompson flood that occurred in 1976. The memorial itself is a small garden. Bricks inscribed with different names and messages make up the base of the memorial. A few benches make up the perimeter of the memorial. Each bench is inscribed with different memorial messages such as “In Memory of Keith & Wilma ‘Billie’ North, We Love You More.” Surrounding the benches is some green shrubbery and grass (Figure 2)².



Figure 2. Big Thompson Memorial

² All photos in the thesis are by the author

The main feature of the memorial is a bronze carving of the canyon landscape with doves carrying a plaque listing the 144 lives lost in the flood. There are a few other plaques around providing details on who dedicated the memorial, which donors contributed, and the sculptor of the piece. Embedded on either side of the bronze landscape, two additional longer plaques provide more information (Figure 3). The first presents a detailed description of the event, including time and date and the number of lives lost. This plaque was dedicated in 2001. The second plaque is a written reflection from Karen Haskell and Barbara Anderson about their experience after the flood.

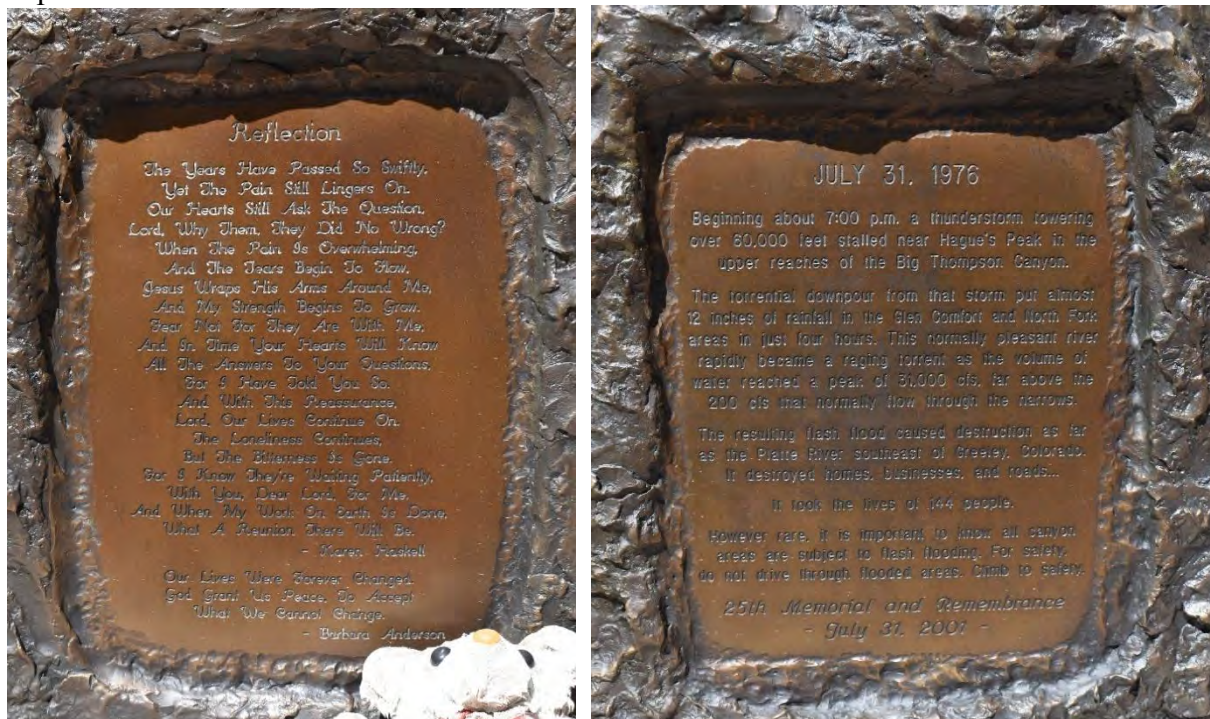


Figure 3. Plaques found at the Big Thompson Memorial

Scattered throughout the memorial site, there are small objects that previous visitors have left behind. Some left small stuffed animals, such as stuffed bears. Others have left American flags and dog and airplane figurines. There are also different Christian crosses and wrist bands.

This memorial fits within the *text* category. The plaques provide a detailed guide to understanding the memorial. The spatial location, close to the river, reminds visitors of the flood and the magnitude of the event. The plaques are also physical reminders of who authored the memorial.

This memorial also fits within a second category proposed by Dwyer and Alderman, memorials as *performance*. The memorial serves as a stage for the memory of the event. Every year people travel to the memorial for a vigil to remember who was lost and leave objects with symbolic meaning. The memorial is also designed to act as a physical stage with an open area for people to gather. During my first visit to the site, an older woman approached me and asked me why I was taking pictures. We ended up talking for a bit and she told me about her relationship with the memorial. Every so often she and her husband make the trip up to clean off her father's brick. She also mentioned that she used to be a driving instructor and always took students up to the memorial not only to experience mountain driving but to educate them on the importance of the flood.

This memorial tells the story of the flood through a *single-point narrative*. The memorial memorializes a single event, the 1997 Big Thompson Flood. The plaques and physical location help cement the event in time and place. Small details such as the plaque titled "Reflections" and the small gifts left behind, emphasize the sense of loss and remembrance associated with the event.

This site would also be considered a *marked* site by the Lichtenstein brothers. The site has received public recognition from the nearby city governments. The memorial also has an official website, and the site is well maintained and cared for. The layout of the signage and benches give the site an organized visual composition.

Lastly, this memorial fits within the *sanctification* category. This site commemorates lives lost, the damage that occurred, and the sacrifices made by the first responders. The site is distinct and stands out, catching people's attention from the road. The bronze landscape and plaques help communicate what occurred. The memorial is maintained and kept clean and free of vandalism. The memorial transforms the site from the edge of the road next to a fire station to a memorial location, transforming the cultural landscape. People come to this site to view the marker, some even make the trip each year to remember friends and family. Finally, another commemoration effort has occurred around this site. Additions have been made to the site expanding it. Bricks and benches have been added. The small gifts left behind are also additions to the site.

Human Spirit

Human Spirit is located in Fort Collins, Colorado on the site of a former manufactured home community. This statue, created by Jack Kreutzers in 1999, serves as a memorial for the 1997 Spring Creek flood. The



Figure 4. Human Spirit a bronze statue of figures

memorial is a bronze statue of three people, two men and a woman, midmotion. One of the men holds a small child, and the other holds a dog (Figure 4). The figures are life-sized and elevated on an approximately 2-foot-tall platform made of stone. There are three different plaques along the base. One plaque has the name, Human Spirit, and the name of the artist. Another has information about the donors. The last gives a short description of the event this statue commemorates, and the number of lives lost in the flood.

The statue sits in a big green park, Creekside Park, alongside Spring Creek. The park has no play equipment, but some picnic benches are spread throughout the area. There is one covered picnic area a short distance from the memorial. A sidewalk separates the statue from the creek edge. A bridge allows residents to cross the creek. Across the bridge sits a Dairy Queen that

many residents enjoy visiting during the summer. Many people walk with their ice cream down to the park and sit along the creek.

While visiting the site, I observed a small family interacting in and around the site. The parents both took time to look at the plaques while the children rested their bikes on the statue and began to play. Later, the parents took the time to tell their children about the statue and what it represented.

This memorial fits into Dwyer and Alderman’s memorials as a *text* category. This statue acts as an addition to the memorial landscape. The park itself holds the memory of the flood but the memorial acts as a visual representation of the memory. The three figures visually reenact action taken by residents at the time of the flood, saving small children and animals. It also sits close to the body of water responsible for the flood. By situating the statue close to the water, visitors hear the water flow, adding the context of sound to the experience. The memorial also sits on the land that used to be the manufactured home community where four people died. One of the plaques highlights the number of fatalities (Figure 5). Through the plaques, the story is briefly recounted through the text provided: A flood occurred and 5 people died.





Figure 5. Plaques found on the stone platform under Human Spirit

This memorial tells this story through a *single-point narrative*. The statue situates the flood in the park alongside the creek. The figures in the statue represent the people who fled from the exact location where the memorial sits. People visiting the park interact with the statue and connect the information presented in the statue to the place they are physically standing. Through the memorial, visitors are presented with a reflection of what the area looked like and felt like during the flood.

This site would also be considered a *marked* site by the Lichtenstein brothers. This site has received endorsement by the local authorities and is a recognized public memorial. The memorial is listed on the official website of the Fort Collins government. It has a striking visual presence anchored by the life-size bronze statue.

This site is positioned on the *sanctified* side of Foote's spectrum of commemoration. The site fulfills the five categories. It is distinct and stands out. It clearly marks what occurred, shown through the people depicted fleeing the flood. The statue has been maintained. Objects on the site are not decolorized or vandalized. The site itself was changed from a neighborhood to a public park, a transformation of the cultural landscape as a result of the flood. People come to this site

to view the statue and spend time in the park. Finally, another commemoration effort has occurred around this site. Close by stands a water marker and informational signs about the 1997 flood.

Raindrops

In the same park where Human Spirit is located, Creekside Park, there is an artistic water marker. The piece is titled Raindrops and was created by artist Mark Lechliter in 2012. This water marker indicates the water levels for a 10, 50, and 100-year flood as well as the 1997 Spring Creek Flood at the very top. It is metallic with small blue waves indicating the different water heights (Figure 6 and 7). Raindrops is positioned on the edge of the creek, a few feet away from the water. There is a bridge close by with two informational signs attached. One sign is a map of the area surrounding Raindrops. It gives a more detailed description of the water marker, listing specific floods that fall into the different categories of floods (Figure 8). The second plaque includes information on flooding mitigation the city has implemented (Figure 9). It includes information on stream restoration, capital projects/maintenance, floodplain management, and master planning. It also displays data about each flooding event, such as the amount of rainfall and damages that occurred with different floods.



Figure 6. Water marker titled Raindrops



Figure 7. Three of the water level markers on Raindrops

The Raindrops water marker fits into the *text* category proposed by Dwyer and Alderman, similar to Human Spirit. The information that accompanies this marker is intended to be read and internalized. It serves to inform the public on the risk flooding poses, presenting examples and listing different ways risk can be avoided. These are layers of public knowledge embedded in the signs. The information is also in part presented in maps of the city, which act to situate the event in time and place.

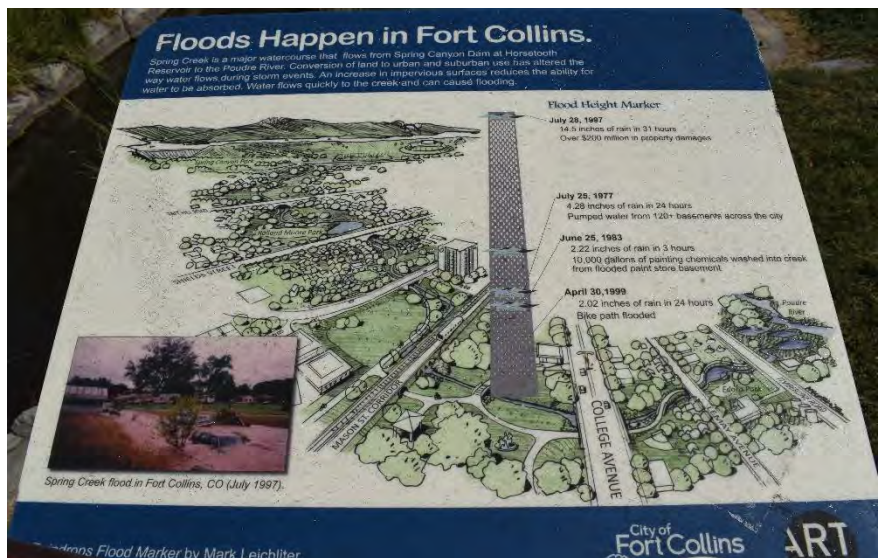


Figure 8. Plaque located on a bridge over Spring Creek

The map also shows that this memorial is presented in a *single-point narrative*. Through the map, viewers are able to see the exact location of the flood. The style of the map indicates time as well as the date markings around the sign and memorial.

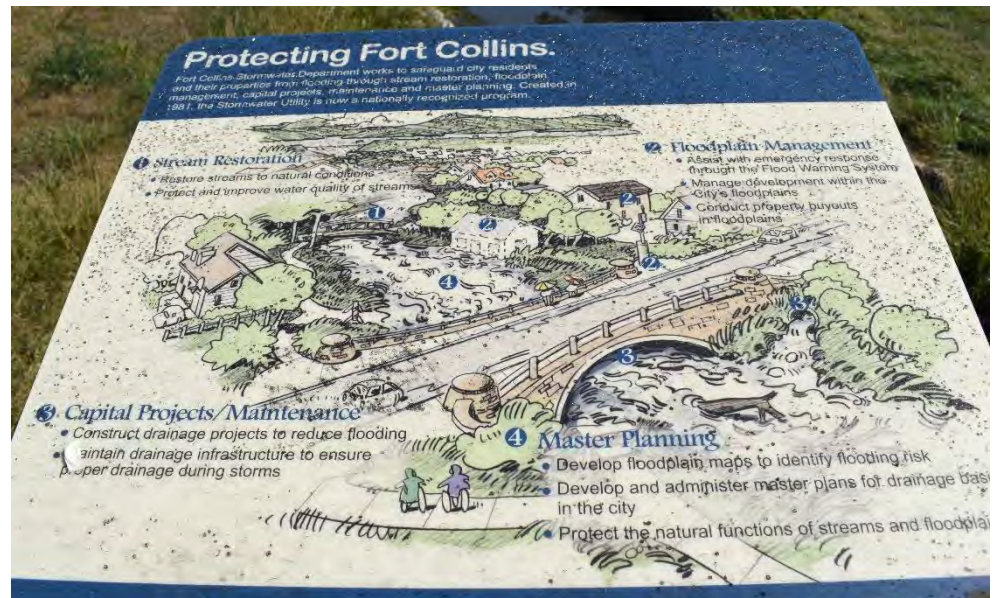


Figure 9. Plaque located on a bridge over Spring Creek

This site would be considered a *marked* site by the Lichtenstein brothers. This site has received endorsement by the local authorities and is a recognized public memorial. The informational plaques are marked with the official city of Fort Collins logo as an Art in Public Places Fort Collins logo. Raindrops is officially listed on the official website of the Fort Collins city government. Like Human Spirit, the artistic nature of the marker emphasizes the visual aspect of the marker in the landscape.

Finally, Raindrops would be found within Foote's *designation* category. The site is marked for its importance, but this part of the site is not sanctified. No mention is made of lives sacrificed or lost. The marker literally marks the important events, but it is not the main attraction, and people do not journey there just to see it. It acts as an addition to the previously created memorial landscape.

CSU Campus Marker

This memorial is located in Fort Collins, Colorado, on the Colorado State University campus. The memorial has two different parts. The first memorializes the 1997 Spring Creek flood. The second commemorates Elwood Mead and the first class taught on a college campus about irrigation engineering. This paper will focus on the first section that memorializes the 1997 flood.



Figure 10. Flood Memorial located on the Colorado State University campus

The memorial is located by the Engineering building in a section of campus that did not flood in 1997. The memorial is meant to be a fountain, but it is not turned on. It is abstract, made out of glass, metal, and concrete. The water flows through a cone-shaped piece of metal and follows the stone canal to the section of the memorial dedicated to irrigation (Figure 10). There

are plants in and around the memorial that connect the portion that remembers the flood to the part that remembers the irrigation class. Plaques scattered around the fountain provide information on the different events. The plaque closest to the fountain provides information about CSU's response to the flood. It focuses on the recovery from the flood, listing people and foundations who made financial contributions towards the campus's recovery (Figure 11).

The site falls into the *text* category proposed by Dwyer and Alderman. The information provided on the plaque gives visitors background information on the memorial. The plaque



Figure 11. Plaque found near the flood memorial on Colorado State University's campus

narrates the site and gives viewers a preview of the intention behind the site. The memorial itself acts as a physical reminder for passersby of what happened back in 1997. But it is important to note, the memorial is

located in a section of campus that did not flood; it is spatially displaced from the 1997 flood event. This displacement detracts from the experience but only to those who know. The

memorial itself gives no indication that this area of campus did not flood. It is unclear why the flood memorial is located where it is and in proximity to the irrigation class memorial.

This memorial tells the stories through a *single-point* narrative. The plaques and physical location help cement the event in time, 1997, and place, CSU campus. The plaques also recognize people who donated to the recovery of the campus. The sign gives no mention of the effects of the flood outside of the campus.

The marker also falls into the *marked* category by the Lichtenstein brothers. It receives official recognition and was commissioned by Colorado State University.

Finally, the site would be considered a *designated* site by Foote. The site does not remember any heroic acts or loss of life. The site is partly maintained. The plants around the area are cut and the area is weeded. But the fountain does not run, the glass is foggy, and the metal has begun to rust. But the site still serves as a reminder of what transpired there. It is also important to again note that the site where the memorial physically rests did not flood back in 1997. The memorial appears to be placed close to the engineering building due to the part commemorating the irrigation class.

Lyons Memorial Labyrinth

The Lyons Memorial Labyrinth is located in Lyons, Colorado along the bank of the St. Vrain River³. The labyrinth is accessible by a path on the side of the road. The first thing you encounter as you enter into the area surrounding the labyrinth is a sign hung between two trees

³ According to the Oxford dictionary, a labyrinth is defined as a complicated series of paths, which it is difficult to find your way through. Labyrinths also have religious meaning. Labyrinths use sacred geometry or the ratios to create forms that help users achieve their desired spiritual goal ((*The Labyrinth Society: Sacred Geometry and Labyrinths*, n.d.)

“Lyons Memorial Labyrinth” (Figure 12). Below it is a series of art pieces, ranging from metal signs that say “believe” to magnets and small drawings. As you continue into the area, the labyrinth comes into view (Figure 13).



Figure 12. Sign found at the entrance to the labyrinth

The labyrinth itself is made out of river stones that were displaced during the 2013 flood. The stones are about one to two feet in diameter. Hundreds of these stones are laid single file to outline the path of the labyrinth. The labyrinth is circular with the entrance on the outside and the end in the middle. All around the labyrinth, there are small installations of art. Some are sculptural. There are masks, signs, and pictures hanging from trees. There are also larger art installations like the large metal and wood heart sculpture. Other than the small sign at the

entrance, there are no other indications of who the artists are and what the different art pieces represent. Most of the site remains unmarked.



Figure 13. Labyrinth made from displaced river rocks

This memorial fits into Dwyer and Alderman's *performance* category. The memorial serves as a stage for different community members to come and participate in different activities, such as reflection and remembering. People can also come and contribute artwork, either creating it there or bringing it from home. Visitors can walk through the labyrinth itself. While people walk through and interact with it, the labyrinth shapes the memory of the flood through a bodily performance. It also creates the space for a community ritual. The art around the area is engaging and allows people to stop and think. The art acts as a display for the collective community memories.

This site displays the memories and story of the flood through a *complex narrative* or sequence (Azaryahu & Foote, 2008). The site is centered around one event, the 2013 flood, but it tells a variety of different stories from a variety of different people. This is done through the different art installations. The labyrinth acts as a uniting element but all the installations tell their own story, connecting the site to people's experiences of the past. Each one is an individual or small group visually representing and displaying their memory of the flood.

Unlike the other memorials, this one would fall under the *remembered* category proposed by the Lichtenstein brothers. In this category, sites receive an individual or collective local effort to commemorate the event in face of disinterest or unofficial recognition. This site has minimal marking and does not appear on any official website of the Lyons city government. But it is clear that the community values and supports the site. The art shows minimal signs of discoloration, fading, or damage. The labyrinth is clean and has a clear path.

The memorial labyrinth would also be found within Foote's *rectification* category. The site has been altered; stones displaced by the flood have been rearranged into a labyrinth. There are no signs connecting the area to the 2013 flood. It has been repurposed into an area for community gatherings and art. But there are elements of this site that cause it to have a compelling argument to place it in the *sanctified* category. The site is well maintained and continues to receive prolonged attention. The memorial is a site of ritual where people come to walk through the labyrinth to think and reflect. People return to the site again and again and the number of art installations continues to grow. In this memorial, the relationship between memory and landscape is especially evident in the interactive nature of the site.

Gilbert White Memorial

The Gilbert White Memorial is located in Boulder, Colorado, on the shore of Boulder Creek. The artist behind this memorial was Mary White, the daughter of Gilbert White. The areas upstream and downstream from the marker have undergone extensive flood mitigation, lowering and widening the creek's floodway, adding breakaway bridges, and adding infrastructure to manage floodwaters. Across the sidewalk from the memorial is a large park and amphitheater. During the warm parts of the year, the Boulder Farmers Market occurs in the park and attracts a lot of people. The memorial itself is a tall turquoise pillar (Figure 14). It is made out of metal, glass, and stone. It serves not only as a memorial to the father of floodplain management Gilbert White but a water marker for different floods. It marks 50-, 100-, and 500-year floods. The second marking from the top marks the water line for the 1976 Big Thompson flood.



Figure 14. Gilbert White Memorial

A short distance away from the memorial and elevated to the level of the multi-use path, there are two informational signs. One gives information on the frequency of flooding in the front range through a short paragraph and a timeline of major flooding events since 1894 (Figure 15). It also presents information about what to do in the event of a flood. Pictures from previous floods are included, giving viewers a visual representation of what could happen. The second plaque provides information about Gilbert White, including one of his famous quotes, "Floods



Figure 15. Plaque with information with a timeline of major flooding events

paragraph and a diagram with pictures. Finally, the right side of the plaque provides some more detailed information about the water marker. It includes pictures of previous flood events that occurred at each marking.

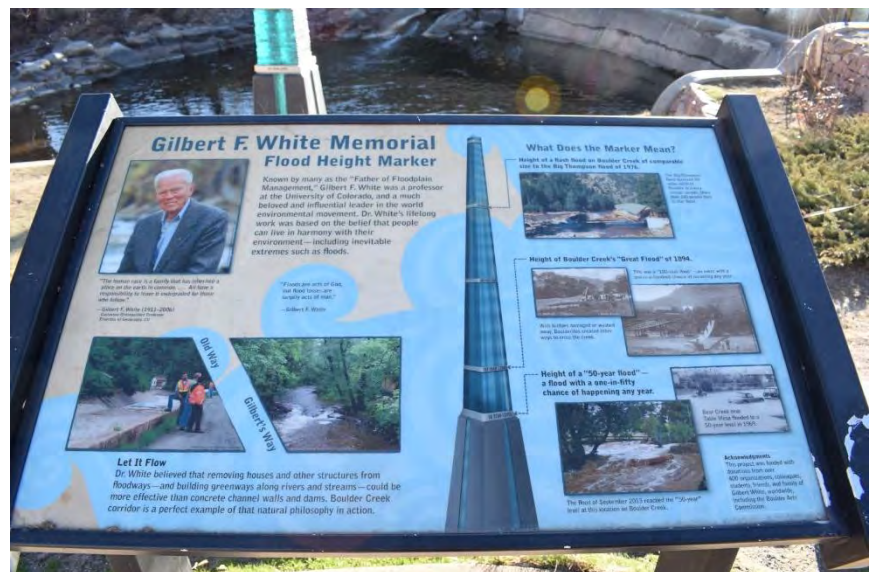


Figure 16. Plaque with information about Gilbert White

Similar to the water marker found in Fort Collins, this memorial fits within the *text* category. The plaques provide a detailed guide to understanding the memorial. The memorial itself presents a tangible mark of what happens during a flood: the height of the water. The plaques provide the rest of the information needed, layering information about the risks associated with flooding and how Gilbert White mitigated those risks. The spatial location of the memorial is another important detail within this category. The marker sits near Boulder

are acts of God, but flood losses are largely acts of man” (Figure 16).

Next to a picture of White, there is a short biography of his life. Further down the plaque, there is information about the different floodwater mitigation actions White proposed over his life. This information is presented both through a short

Creek, the body of water that flooded. The memory of the flood for some residents is tied to this area as it was one of the areas that were heavily impacted. The addition of the marker coupled with the floodwater mitigation technology solidifies this area's history of flooding.

Slightly different from the other memorials, this marker tells a story through a *complex narrative*. This marker provides information about multiple floods across different locations and times, pairing the spatial and narrative components of the memorial. At the very top of the pillar, the 1976 Big Thompson flood is marked, a flood that occurred in and near Loveland, Colorado. The memorial also commemorates the life of Gilbert White. This memorial is different from the others, memorializes multiple events, and is an important figure in the field of natural hazards management.

This site would also be considered a *marked* site by the Lichtenstein brothers. This site has received endorsement by the city of Boulder and is a recognized public memorial. The memorial is also recognized on the Natural Hazards Center's website. The suite of signage and memorial form a visual representation of symbolic meaning associated with flooding in the Front Range.

According to Foote's spectrum, this site fits within the *sanctified* category. Not only does this site memorialize different flooding events, but the site's main focus is also on remembering Gilbert White, connecting memory to the landscape. The site fulfills the five categories. The site is distinct and stands out. It clearly marks what occurred, shown through the pictures on the information plaques. The pillar is maintained, and the area is kept fairly clean. It is not decolorated or scandalized. The addition of the memorial transformed the site from a creek edge to a memorial location. People come to this site to view the marker and spend time in the park.

Finally, another commemoration effort has occurred around this site, and there are two additional signs about 200 yards downstream from this site. Further up towards the park, there is another memorial commemorating the Black Lives Matter movement of 2020.

Memoria

Memoria is located in Loveland, Colorado, up in the Big Thompson Canyon along the Big Thompson River. It was created by Dewitt Godfrey in 2019. It is part of a larger park, Viestenz-Smith Mountain Park, with other features spread out throughout the riverside. There is an old structure and some objects that were displaced by floodwater. The memorial itself is made out of steel. It was created by stacking circular shapes on top of each other to create a larger circle that stands over 10 feet tall and 40 feet wide. The circles are large enough for the average person to sit inside them. There is an entrance reminiscent of a doorway at the front of the structure (Figure 17). Close to the entrance sits a small rock with a plaque on it. The plaque has a



Figure 17. A bronze memorial located along the bank of the Big Thompson River

short quote “wherever a beautiful soul has been, there is a trail of beautiful memories,” the name of the memorial and artist, and a description of how the piece was financed (Figure 18). Upon



Figure 18. Plaque found on a rock outside the entrance of Memoria

further research on the artist’s website, it was revealed Memoria was created to replace memorials lost in the 2013 Front-Range flood.

Memoria fits into the *performance* category of Dwyer and Alderman’s categories. While visiting the site, a family with small

children was also there. The

children played in and around the memorial, climbing on it and taking pictures with their parents. Memoria provided the physical space or stage for the children to run around in. I visited the site with my father, and he heavily encouraged me to climb in and around the sculpture. He himself even participated and climbed in some of the circles.

The design of the site neither encourages nor discourages visitors to interact with their memory of the flood. Instead, the memorial itself is a form of performance. The sculpture was created in response to the flood and the loss of other memorials. This site is a physical display honoring the memories of the previous memorials.

The site narrates this story in a *complex sequence*. As Godfrey's website explains "when the 2013 flood tore through the Wiestenz-Smith Mountain Park...it destroyed more than 50 memorials located within the park" (*Memoria*, n.d.). The memorial is designed to tell the story of not just one site but the multiple memorials that were destroyed. These memorials were also scattered spatially throughout the park and varied in location and content. But this categorization is complicated by the fact this information is omitted from the site itself. If the site is approached without the information provided on the artist's website, the memorial would fall into the *single-point narrative* category. The site itself includes few details and gives no mention of the memorials that came before. For visitors at the site, the memorial is simply a statue titled "Memoria." But the sculpture is meant to be a consolidation of the memory of memorials that came before

Memoria would also be considered a *marked* site by the Lichtenstein brothers. It receives official recognition and was commissioned by the city of Loveland. This information is presented in the plaque that accompanies the sculpture, "commissioned by the city of Loveland." The sculpture is a distinctive visual object that invites people in through its entrance, emphasizing its nature as marked.

Finally, this memorial would fall under the *designation* category. The site does not remember any heroic acts or loss of life. It does memorialize the loss of property and art. The site is maintained but does not receive lasting attention. The site continues to commemorate the 2013 flood, but it does not call a lot of attention to it. There are no pilgrimages or events that occur at the site.

Memorial at Linden Drive and South Cedar Brook Road

This memorial sits at the corner of Linden Drive and South Cedar Brook Road in Twomile Canyon, the northwest part of the city of Boulder. It memorializes two of the lives lost as well as first responders and recovery efforts that happened in response to the flooding that occurred in Boulder in 2013. The memorial was dedicated five years after the event in 2018.



Figure 19. Flood memorial located on the side of the road at the intersection of Linden Drive and South Cedar Brook Road

The memorial sits off to the side of the road. The area where this memorial sits flooded during the 2013 event. Debris flows from the mini canyon nearby filled the stream, turning the road into a river and washing away part of the road, and covering the rest. It features a round bench made of stone surrounded by a decorative green metal fence. Behind the area enclosed by

the fence, there is a small decorative garden with small sculptures throughout. The sculptures are decorative and stick up from the garden. The garden is xeriscaped with mulch and rocks in between the plants (Figure 19). A plaque sits at the entrance detailing the event, lives lost, and the first responders. It gives special attention to two people lost in the flood, Wiyanna Nelson and Wesley Quinlan (Figure 20).

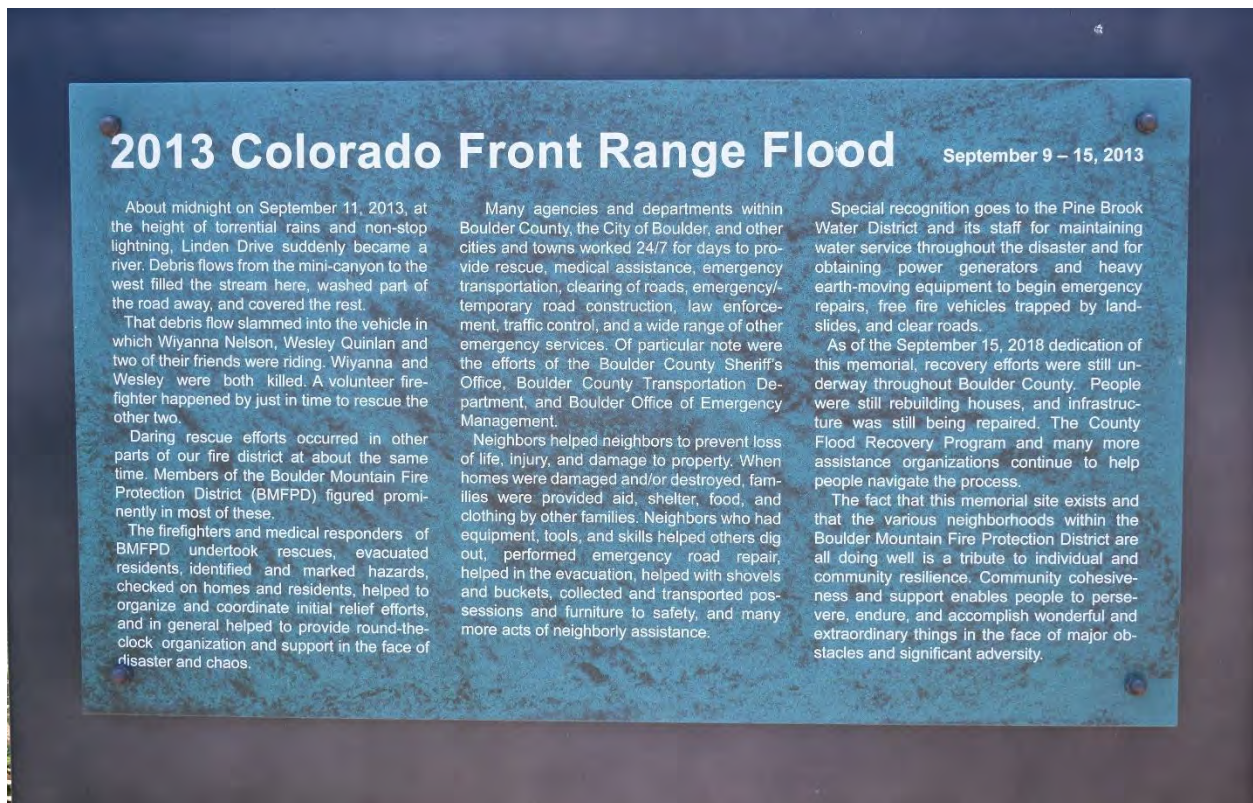


Figure 20. Plaque found outside the entrance to the Flood Memorial

This memorial fits into Dwyer and Alderman’s memorials as *text*. It is located in the canyon that was filled with water and debris flow that washed away part of the road. This sets the scene of the memory. The plaque narrates the event, providing an outline of the event. The plaque provides the voice of those who authored the memorial. Through their words, visitors

experience the memorial. Its location near the site where Nelson and Quinlan lost their lives also emphasizes the spatial role in collective memory (Dwyer & Alderman, 2008).

The history of the event is presented in a *linear narrative*. The plaque gives information on the flood, what happened at the location of the memorial, as well as the greater Boulder area. The first responders and the Boulder County Flood Recovery Program are highlighted. The memorial is at the center of the narrative but gives voice to other important details. The physical site is connected to the past through its proximity to areas affected by the flood, but the information provided on the plaque provides a guide to understanding the story of the flood.

This site is an example of a site that moved from the Lichtenstein brothers' category of *remembered* to *marked*. The site of the memorial is important for specific parts of the community, specifically those close to the two individuals who passed away. In my research, I found a video from the day the site was dedicated. The mothers of the people who died talked about the importance of the site to their memory of their children stating, "as a parent, I couldn't have asked for a bigger honor" (Chavez, 2018). They expressed their excitement and gratitude for the memorial. Once the physical memorial was placed and dedicated it moved into the category of marked because it received official recognition from the city and the surrounding community. The memorial provides a visual site on the landscape to mark the memory of loss the community held since the 2013 flood.

This site falls into Foote's category of *sanctification*. This memorial focuses on the people involved in the flood, first responders, members of the community, and those who passed. The site is distinct and stands out from the road, attracting attention from passersby. It marks what occurred, detailed through the plaque. The area is maintained, and the fence is not

decolored or vandalized. The garden is trimmed and weeded. The site itself holds significance. People come to this site to sit at the bench and read the plaque. Finally, the site was dedicated and commemorates heroic acts and loss of life, anchoring community memories in the landscape.

How tall are you in flood years? Mural

This mural is located in Martin Park in a residential area in the southern part of Boulder, Colorado. This site is distinct from others in the case study because it is a two-dimension rather than three-dimensional memorial. The mural, painted by Anne Pendergrast, is located on the side of an underpass going under Martin Drive. Across the path from the mural is a tributary of Boulder Creek, Bear Canyon Creek. The mural is about 10 feet tall. It is primarily blue with yellow and white highlights. The main feature of the mural is a large yellow ruler where viewers can measure “their height in flood years.” Next to the ruler on the left are paintings of fish and water. On the right side of the ruler, different types of floods are marked (Figure 201). In total, the mural indicates the height of a 2-, 5-, 10-, 25-, 50-, and 100-year flood. It also indicates the water height of the 2013 flood. More information is found written in bold white letters. The mural

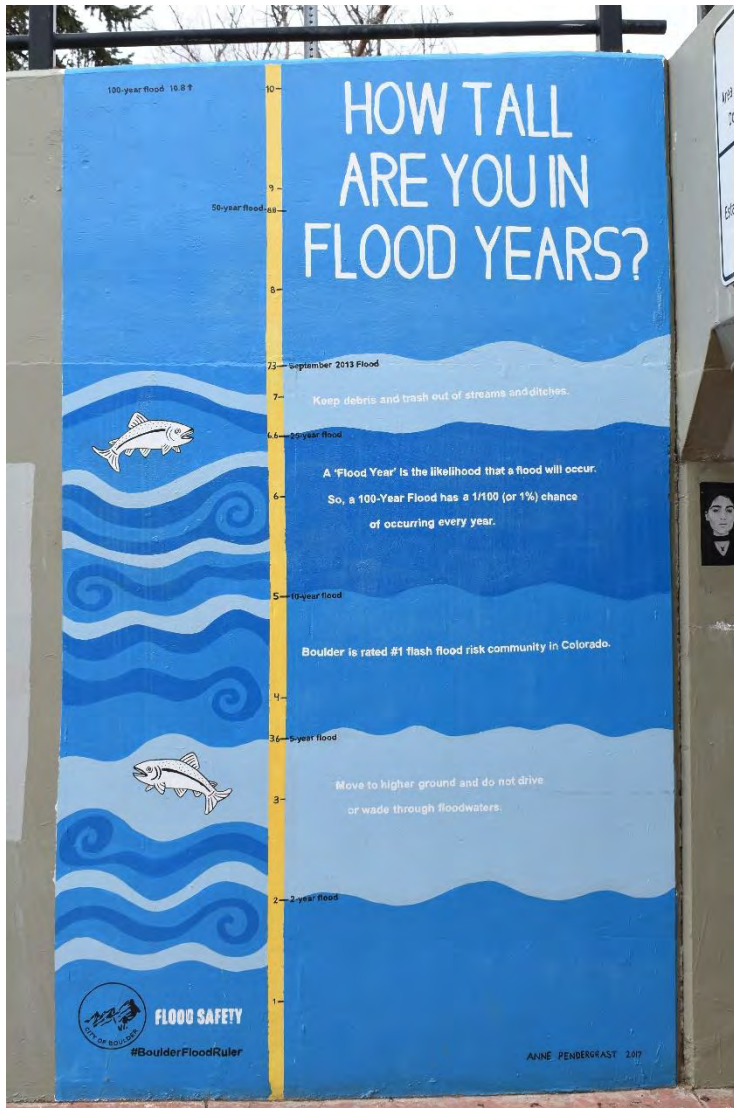


Figure 21. Mural measuring visitor's height in flood years

provides some facts about the area including information about what to do in a flood, what a 'flood year' means, and that Boulder is rated a number one flash flood risk in Colorado.

There are a variety of other murals found along this underpass. The other murals lack text and present a variety of different subject matter. Some of the murals appear to be painted by young children. Other murals have a lot of detail. Some of the murals are of dogs and people, while others are more abstract in nature (Figure 22).



Figure 22. Murals found under the Martin Drive Bridge

This mural fits into the *text* category proposed by Dwyer and Alderman. The mural has a clear author, the artist, and clear readers, passersby who walk on the trail. The site provides interactive educational information. The mural is positioned near an underpass that acts as flood mitigation, directing the water away from the residential area, protecting the path. The location of the mural acts as the setting for the information presented.

This memorial also presents the information in a *single-point* narrative. The information provided alongside the ruler gives viewers information about flooding in general but centers on the 2013 flood. The location of the mural along with the inclusion of the ruler situates the mural in a specific setting. When viewers interact with the mural, measuring themselves, they are present in the moment in this specific location with the mural. This site connects directly to the 2013 flood event in the mural's space; people standing at the mural can imagine that they would be underwater in the 2013 flood.

This site would also be considered a *marked* site by the Lichtensteins. This site has received endorsement by the local authorities and is a recognized public memorial. At the bottom of the mural, the official city of Boulder logo is painted.

Finally, this memorial fits into the *designation* category presented by Foote. The mural does not remember any heroic acts or loss of life. It does memorialize the height of the water during the 2013 flood. The memorial has not received lasting attention. The mural has some signs of age, with some discoloration occurring. There are no pilgrimages or events that occur at the site. Yet, the site has been modified to remind people of the effects of the 2013 flood on the landscape.

House Removed

This memorial is located along the side of the Boulder Creek Path close to the 17th street bridge. It is made up of a small set of concrete benches that form part of a square (Figure 23). “November 2004, House removed from high hazard floodplain” is engraved into one of the benches. The benches appear to be arranged in a way that mimics the shape of a corner room in a house. It is a fairly straightforward memorial, recognizing a flood mitigation effort completed in 2004.

This marker fits within the *text* category proposed by Dwyer and Alderman. It is a physical marker of what happened. It serves as a guide to the area beside the path and creek side. It has a clear author and clear readers. The author is the city and its removal of the house, and the audience is the members of the community that walk along the creek path and choose to sit on the benches.

This marker also provides a simple *single-point* narrative of the events. A house was removed from this location at the specified time, 2004. It would also be considered a marked site.



Figure 23. Benches marking a house removal along the edge of Boulder Creek

This site falls into the *marked* category of the Lichtenstein brothers. The benches mark the house's removal and serve to remind community members of the ever-present threat of floods. This site reminds visitors that preventative action can be taken to mitigate flood damages.

Finally, this site falls into Foote's category of *rectification*. The site has been altered; a house was physically removed. The connection between the house and the site has weakened over time. The only physical connection is the set of benches. There are no other signs of the

house. The site was cleaned up and has been left alone. It has been repurposed into a community gathering area.

Table 1. Categorization of ten memorial sites according to Foote (1997)

Obliteration	Rectification	Designation	Sanctification
	Lyons Memorial Labyrinth	CSU Marker	Human Spirit
	House Removed	Raindrops	Gilbert White Memorial
		Memoria	Big Thompson Flood Memorial
		How tall are you in flood years? Mural	Lyons Memorial Labyrinth
			Linden Drive and South Cedar Brook Road Memorial

Table 2. Categorization of ten memorial sites according to Dwyer and Alderman (2008)

Text	Performance	Arena
Human Spirit	Big Thompson Flood Memorial	
Raindrops	Lyons Memorial	
Gilbert White Memorial	Memoria	
Big Thompson Flood Memorial		
Linden Drive and South Cedar Brook Road Memorial		
How tall are you in flood years? Mural		

Table 3. Categorization of ten memorial sites according to Lichtenstein and Lichtenstein (2017)

Marked	Unmarked	Remembered
Human Spirit		Lyons Memorial Labyrinth
Raindrops		
Gilbert White Memorial		
Big Thompson Flood Memorial		
House Removed		
Memoria		
Linden Drive and South Cedar Brook Drive Memorial		

How tall are you in flood years? Mural		
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Table 4. Categorization of ten memorial sites according to Azaryahu & Foote (2008)

Single Point	Linear Narrative	Complex Sequence
Human Spirit	Gilbert White Memorial	Lyons Memorial Labyrinth
Raindrops	Big Thompson Flood Memorial	
Memoria	Linden Drive and South Cedar Brook Drive Memorial	
CSU Marker		
House Marker		
How tall are you in flood years? Mural		

THE BOIARSKY SCALE

Overall, this analysis focused on the ways in which memorials create meaning on and through the sites they occupy. There is a trend within this case study of ten flooding memorials. All but one memorial falls into the *marked* category, with the Lyons Memorial Labyrinth falling into the *remembered* category, showing that a majority of these sites have received official recognition (Table 3). Most of the memorials fall into Foote’s categories of *designation* or *sanctification* with one in the *rectification* category, demonstrating the importance placed on these sites (Table 1). Within Dwyer and Alderman’s classifications, the memorials are categorized into *text* and *performance*, illustrating a memorial’s role on the memorial landscape (Table 2). Finally, in the classification proposed by Azaryahu and Foote, focusing on the narrative presentation, the sites congregate in the *single point* and *linear narrative* category with one site, Lyons Memorial Labyrinth, presenting a narrative in a *complex sequence* (Table 4). This solidifies the idea that the flood memorials examined presented information in a variety of ways.

These four classifications create a foundation for the next classification, the Boiarsky Scale. This new classification takes the information from the others and brings it a step further, establishing a specific classification for natural hazard memorialization. This new set of categories seeks to place human-environment interactions at the forefront of these memorials. This classification critically examines the ways in which communities memorialize natural hazards, allowing a deeper understanding of the relationship between these memorials and community mitigation efforts. The following section places the ten flooding memorials into one of the new proposed categories. It is important to note, no memorial within the case study fits into the *Hazards as Human-Caused Event* category. This category contains events directly caused by human actions such as a levee breaking or a nuclear meltdown. All memorials in the case study commemorate flooding events.

Hazard as a Natural Event

From the case study, six memorials fit into the category that depicts floods as solely natural events. Those four memorials are the Big Thompson Flood Memorial, Human Spirit, the CSU Flood memorial, Flood Year Mural, Lyon's Memorial Labyrinth, and Memoria.

The Big Thompson Flood memorial focuses on the number of lives lost and the destruction caused by the flood, framing the flood as a destructive event that happened to the people in the area. Throughout the site, there are multiple plaques that mention the fatality count. At the center of the memorial is a large bronze plaque with two doves at the top. Written on the plaque is a list of the name of every person lost in the flood. The other plaques around the memorial emphasize the magnitude of the event, using language such as "torrential downpour" and "raging torrent." The plaques also describe the Big Thompson River as a "normally pleasant river." There is little mention of preventative steps that can be taken to lessen the loss of life or

property. The only mention of potential actions is at the base of the main feature of the memorial that states the frequency of such events and encourages people not to drive through flooded areas but instead climb to safety. This information is de-emphasized, as it is located at the bottom of the memorial, out of direct view. Visitors have to know to look for it. The information also provides a reactionary action rather than a preventative action which further emphasizes the inevitability of loss from the flood.

The flood memorial on Colorado State University's campus frames the flood of 1997 as an inherently natural disaster through the plaque found near the memorial. This plaque memorializes those who participated in the recovery efforts and those who contributed financially to the campus. At the beginning, there is a short paragraph that gives viewers enough context to understand that this site exists to commemorate the destruction the 1997 flood caused on the campus. It uses phrases such as "worst natural disaster in campus history." Similar to the other memorials in this category, there is no mention of mitigation efforts or human interaction beyond the loss of property.

Human Spirit in Fort Collins presents the 1997 flood as a tragedy that happened to people. The memorial itself depicts people fleeing from the floodwaters. One of the plaques further emphasizes this by using words such as "tragedy" and "victims" to describe the event. The information provided mentions the loss of life and damage afflicted by the flood, but it does not mention any preventative actions that can be taken in the future. While this memorial centers on the community, it continues to present the flood as a natural event with unavoidable damages.

The interactive mural that discusses flood years frames flooding as a purely natural event. It is a simplistic mural, probably designed for children, that presents limited information. The mural is centered around the concept of flood years. It explains what a flood year is and includes the different flood water heights for different flood years. Only two of four sections of information provide instructions on what to do in a flood. One of the sentences instructs viewers to “keep debris and trash out of streams and ditches.” But this information is vague. Should viewers do this before the flood or during the flood, and what is the purpose? The other section tells viewers to seek higher ground and to not drive through floodwaters. There is no mention of preventative measures or actions communities can take to decrease losses from flooding. This mural frames floods as events that happen to people with unavoidable consequences, only slightly mitigated by action in the moment of flooding.

The Lyons Labyrinth takes a different approach to other memorials in this category. This site focuses on human loss and resilience after the 2013 flood. At the site, no information is provided connecting the labyrinth to the event. Instead, more information can be found online connecting the flood to the memorial. But the site’s location connects the memorial to the flood. The stones used in the labyrinth also provide a tangible connection to the flood. But unlike the other memorials in this category, there is no written explanation about the relationship between people and floods. Rather, this connection is communicated through the labyrinth. The labyrinth is made out of displaced stones from the river and is located close to the river and flood zone.

The art installations around the labyrinth serve as the connection to human resilience and loss. The pieces have differing levels of damage and distress indicating they were placed at different times. The constant addition to this space shows the community’s resilience. Members of the community continue to come here, reflecting and creating in the space. The pieces

themselves have hopeful and inspiring messages. The image below shows art installations with the same sentence “May peace prevail on earth” written on every side in different languages⁴. Another art piece is a collection of rocks of painted rocks with varying messages. Each rock was painted by a different artist. But while the site highlights a human-environment interaction, this interaction occurs post flood. The site makes no mention of actions that can be taken to prevent and decrease flood loss. The flood is not framed as an event that can be worsened or improved by human action. The labyrinth focuses on what happens after a flood.

Memoria receives a special mention in this category but does not fully fit into the category because, overall, little information is provided at the site of the statue. The memorial itself gives no mention of the inspiration or intention behind the statue. A single plaque that sits outside the statue states, “Wherever a beautiful soul has been, there is a trail of beautiful memories.” It simply provides the name of the statue, the artist, and who it was commissioned by. Neither the statue nor the plaque provides any context for linking the site to the 2013 flood. The only information connecting Memoria to the flood is a small artist statement on the artist’s website. A two-sentence paragraph reveals Memoria was created to “honor and continue the spirit of [the] memorials [lost in the flood] by ‘proving a place of memory and contemplation.’” No mention is made of human-environment interactions, such as mitigation efforts or recovery. No mention is also made about the type of flood or frequency.

Hazard as a Human-Environment Hybrid Event

Four of the ten memorials fit into the category recognizing the human-environment hybrid nature of the event. In this category, memorials acknowledge the complex relationship

⁴ This is a Peace Pole. Each pole bears the message “May Peace Prevail on Earth” in different languages on each of the four or six sides (“Peace Pole Project,” 2018).

that occurs between people and their environment during a natural disaster. The four memorials that fit into this category are: Raindrops, the Gilbert White memorial, House Removal Marker, and the 2013 Flood memorial at Linden and South Cedar.

Starting with the water marker found in Fort Collins, Raindrops, we see the memorial presenting the flood as a human environment hybrid event. The water marker provides environmental context for the flood, the water height of different floods. Unlike the flood mural in Boulder, however, the plaques near the water marker introduce different actions communities can take to prevent losses from floods. It highlights four different ways the city is “work[ing] to safeguard city residents and their properties from flooding”: stream restoration, capital projects/maintenance, floodplain management, and master planning. The images presented on the plaques depict people peacefully interacting with the stream within the city, demonstrating the potential results of the aforementioned actions to prevent flood losses.

The next memorial, the Gilbert White Memorial, follows a similar pattern. The memorial acts as a water marker indicating the different flood water heights. In addition, information is also provided about the history and science behind flooding through plaques. Details on these plaques are centered around human action towards floods. They provide information memorializing Gilbert White and his research on flood mitigation and risk reduction. The signs also provide information on how to stay safe during floods.

The memorial marking the house removal from a hazardous floodplain in 2004 is a simplistic example of a memorial within this category. The site itself is connected to a mitigation action, removing a house from a floodplain, through the text on one of the benches. The action is marked but there is no follow-up information about the floodplain or specific details concerning

the efficiency of this action. This memorial sits in this category because it is focused on a tangible action people can take to mitigate flood risk. But the memorial could make a greater impact on visitors by including more information.

The memorial commemorating the Memorial at Linden Drive and South Cedar Brook continues to follow the trend presented by memorials in this category. The plaque present at this site acts as the guide for the memorial. The first paragraph sets the scene, describing the events of the flood. As the information continues, the topic begins to transition into the human impacts of the event. Finally, the majority of the second half of the plaque talks about all the different efforts community members made in helping their neighbors and fighting “to prevent loss of life, injury, and damage to property.” The plaque centers around the human experience of the flood but highlights efforts made by community members to mitigate damages and recover from the flood.

Table 5. Categorization of ten memorial sites according to the Boiarsky Scale

Natural Event	Human-Environment Hybrid Event	Human Event
Big Thompson Flood Memorial	Raindrops	
Human Spirit	Gilbert White Memorial	
CSU Marker	House Removed	
How tall are you in flood years? Mural	Linden Drive and South Cedar Brook Road Memorial	
Lyons Memorial Labyrinth		
Memoria		

LIMITATIONS

There are two limitations faced by this study. First, this thesis primarily focuses on physical memorials, so the analytical categories of *rectification*, *obliteration* (Foote, 1997), and *unmarked* (Lichtenstein & Lichtenstein, 2017) are underrepresented in this sample. These sites

may be found through newspaper articles that detail the locations which received the most damage during the flood. These sites may have been repaired and repurposed making it difficult to locate them. Second, this thesis focused solely on memorials that commemorate flooding events. Further research is necessary to determine how this categorization is applied to other natural hazard memorials and whether similar patterns emerge.

CONCLUSION

In the end, there is a trend within this case study of ten flooding memorials from the Northern Front Range of Colorado. The memorials act as additions to the memorial landscape, shaping the meaning and memory surround these floods. Within Foote's categories, the memorials fit into *designation*, *sanctification*, and *rectification*, demonstrating the community's desire to remember and honor these events. Following a similar path, a majority of the sites fall into the Lichtensteins' categories of *marked* and *remembered*, further emphasizing this idea. Next, a majority of the sites present the history and information about the floods through a *single-point* or *linear narrative* with one site, Lyons Memorial Labyrinth, presenting the information in a *complex sequence* (Azaryahu & Foote, 2008). This exemplifies the different strategies memorial artists use to present different information. Finally, within Dwyer and Alderman's classifications, the sites within the case study fell into the *text* and *performance* categories. These results emphasize the different ways memorials impose meaning on the physical sites. The memorials represent each community's experience with the different floods. These memorials make permanent changes to the landscape thus influencing future generations' perceptions of extreme events.

Ultimately, this thesis sought to fill a gap in literature and research about natural hazard memorialization. This new classification, the Boiarsky Scale, took the information from the other four classifications, brought it a step further and established a specific classification for natural hazard memorialization. This new set of categories seeks to place human-environment interactions at the forefront of these memorials.

Within the Boiarsky Scale, the ten memorials were categorized into the *Hazards as Natural Events* and *Hazards as a Human-Environment Hybrid Event*. No memorial within the case study fits into the *Hazards as Human-Caused Event* category. This category contains events directly caused by human actions such as a levee breaking or a nuclear meltdown. All memorials in the case study commemorate flooding events and thus did not fall into this category. This pattern demonstrates the two ways communities perceive the impact of the human-environment relationship within natural hazards. Some communities recognize the role of human-environment interactions within extreme events while other communities think of natural hazards as purely natural events.

This classification serves as a tool that can be used to critically examine the ways in which communities memorialize natural hazards. This scale may also serve as a useful tool in the field of risk communication. Natural hazard memorials are physical representations of a community's attitudes towards and knowledge of extreme events. This information is important for emergency planners, practitioners, and researchers who study natural hazards. The scale allows for a deeper understanding of the relationship between natural hazard memorials and possible community mitigation efforts. Natural hazard memorials shape the way communities remember extreme events. They have the potential to shape the relationship between future generations and their environments.

REFERENCES

- Aguilar, J., & Brennan, C. (2013, September 21). Eight days, 1,000-year rain, 100-year flood. Boulder Daily Camera. https://www.dailycamera.com/ci_24148258/boulder-county-colorado-flood-2013-survival-100-rain-100-year-flood
- Alderman, D. H., & Finkelstein, K. (2021). Veterans Day: How crosses and mementos help these Marines remember fallen comrades. *The Conversation*. <http://theconversation.com/veterans-day-how-crosses-and-mementos-help-these-marines-remember-fallen-comrades-168444>
- Azaryahu, M., & Foote, K. E. (2008). Historical space as narrative medium: On the configuration of spatial narratives of time at historical sites. *GeoJournal*, 73(3), 179–194. <https://doi.org/10.1007/s10708-008-9202-4>
- Bear, J. (2018). Lyons recovers from 2013 flood, but demographic shift hit town. Boulder Daily Camera. https://www.dailycamera.com/ci_32109649/lyons-recovers-from-2013-flood-but-demographic-shift-hit-town
- Bloom, M. (2018). Five Years After Floods, Jamestown Is Finally Able To ‘Look Forward Again’ | KUNC. <https://www.kunc.org/environment/2018-09-12/five-years-after-floods-jamestown-is-finally-able-to-look-forward-again>
- Castree, N., & Braun, B. (Eds.). (2001). *Social nature: Theory, practice, and politics*. Blackwell Publishers.
- Cheng, Y. (2014). *Telling Stories of the City: Walking Ethnography, Affective Materialities, and Mobile Encounters*. sagepub.com/journalsPermissions.nav

- Chavez, J. (2018, September 11). *Memorial created in Boulder County to honor victims of 2013 catastrophic flooding*. KUSA.Com. <https://www.9news.com/article/news/local/memorial-created-in-boulder-county-to-honor-victims-of-2013-catastrophic-flooding/73-595094055>
- Cudny, W., & Appelblad, H. (2019). Monuments and their functions in urban public space. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, 73(5), 273–289. <https://doi.org/10.1080/00291951.2019.1694976>
- Dubriwny, T. N., & Poirot, K. (2017). Gender and Public Memory. *Southern Communication Journal*, 82(4), 199–202. <https://doi.org/10.1080/1041794X.2017.1332448>
- Dwyer, O. J. (2004). Symbolic accretion and commemoration. *Social & Cultural Geography*, 5(3), 419–435. <https://doi.org/10.1080/1464936042000252804>
- Dwyer, O. J., & Alderman, D. H. (2008). Memorial landscapes: Analytic questions and metaphors. *GeoJournal*, 73(3), 165. <https://doi.org/10.1007/s10708-008-9201-5>
- Foote, K. E. (1997). *Shadowed Ground: America's Landscapes of Violence and Tragedy (First)*. University of Texas Press.
- Foote, K. E., & Azaryahu, M. (2007). Toward a geography of memory: Geographical dimensions of public memory and commemoration. *Journal of Political & Military Sociology*, 35(1), 125–144.
- Forest, B., & Johnson, J. (2019). Confederate monuments and the problem of forgetting. *Cultural Geographies*, 26(1), 127–131. <https://doi.org/10.1177/1474474018796653>
- Jarret, R., & Costa, J. (2006). 1976 Big Thompson Flood, Colorado (General Information Product) [General Information Product]. United States Geological Survey.

- Kates, R. (2011). Gilbert F. White 1911-2006. National Academy of Sciences.
- Langevin, D., & Sullivan, T. (2015, October 22). Spring Creek Flood of 1997 [Text]. Colorado Encyclopedia. <https://coloradoencyclopedia.org/article/spring-creek-flood-1997>
- Lichtenstein, A., & Lichtenstein, A. (2017). *Marked, Unmarked, Remembered*. West Virginia University Press.
- Memoria. (n.d.). DeWitt Godfrey Studio. Retrieved March 22, 2022, from <https://www.dewittgodfrey.com/memoria>
- Natural Hazards Center || Gilbert White. (n.d.). Retrieved March 21, 2022, from <https://hazards.colorado.edu/gilbert-f-white>
- Neumann, R. (2005). *Making Political Ecology: Human Geography in The Making*. Routledge.
- Olsen, C. S. (2019). Urban space and the politics of socially engaged art. *Progress in Human Geography*, 43(6), 985–1000. <https://doi.org/10.1177/0309132518807756>
- Peace Pole Project. (2018, December 22). May Peace Prevail On Earth International. <https://www.worldpeace.org/peacepoleproject/>
- Perreault, T., Bridge, G., & McCarthy, J. (Eds.). (2015). *The Routledge Handbook of Political Ecology*. Routledge. <https://doi.org/10.4324/9781315759289>
- Robbins. (2014). *Environment and Society: A Critical Introduction* (2nd edition). Wiley-Blackwell.
- Robbins, P. (2004). *Political Ecology: A Critical Introduction* (3rd edition). Wiley-Blackwell.

- Sumartojo, S. (2021). New geographies of commemoration. *Progress in Human Geography*, 45(3), 531–547. <https://doi.org/10.1177/0309132520936758>
- The Labyrinth Society: The Labyrinth Society: Sacred Geometry and Labyrinths. (n.d.). Retrieved March 27, 2022, from <https://labyrinthociety.org/sacred-geometry>
- Udell, E. (2017). Spring Creek Flood anniversary: Revisit the deadly night. *The Coloradoan*. <https://www.coloradoan.com/story/life/2017/07/20/spring-creek-flood-anniversary-timeline/493369001/>
- US Department of Commerce, N. (n.d.). Flash Flooding Definition. NOAA’s National Weather Service. Retrieved March 21, 2022, from <https://www.weather.gov/phi/FlashFloodingDefinition>
- Watts, M. (2008). On the poverty of theory: Natural hazards research in context. In *Environment*. Routledge.
- Watts, M. J. (2013). *Silent Violence: Food, Famine, and Peasantry in Northern Nigeria* (Illustrated edition). University of Georgia Press.
- White, G. F. (1945). Human adjustment to floods: A geographical approach to the flood problem in the United States.
- Zavar, E. M., & Schumann, R. L. (2019). Patterns of disaster commemoration in long-term recovery. *Geographical Review*, 109(2), 157–179. <https://doi.org/10.1111/gere.12316>