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COLLECTIVE MEMORY IN A POST-INDUSTRIAL COMMUNITY, ANACONDA, MONTANA: A MIXED METHODS APPROACH FOR UNDERSTANDING COMMUNITY RESILIENCE AND TRANSITIONS

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By

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ABSTRACT

Post-industrial rural communities across the United States are experiencing economic, social, and environmental changes. Successful transitions depend on the ability to navigate change and maintain a quality of life, or a community's resilience. These communities do not start with a blank slate, but rather their present and future decision-making, priorities, and planning are influenced by their pasts. Many of these communities retain strong ties to their extractive identities, histories, and landscapes. Often, collective memories, or how people remember and share knowledge and experiences related to their identity, perpetuate narratives and stories about their pasts. This research draws attention to the social dimensions of post-industrial rural community change. The town of Anaconda, Montana— a former smelting town, Superfund site, and an aspiring tourism and recreation destination— provides an instructive case study to examine the role of collective memory in change and transition. This dissertation uses a mixed methods approach including 33 semi-structured interviews with community leaders, a household survey (n = 347), and 22 phenomenological interviews with community members. Centering analysis on the community scale, research found that collective memory impacts community resilience. Collective memory functions differently throughout time— it can act as a galvanizing force to mobilize and aid in recovery or as a constraint to change and innovative thinking. This research also created quantitative collective memory measures which were tested in a model with community resilience. Findings illuminate a complex temporal relationship between the past, present, and future, where the past influences how communities perceive their resilience, which in turn, influences how they plan and hope for the future. Utilizing collective memory as a springboard, investigation of the community's lived experiences shed light into the complicated nature of contamination cleanup, where these spaces are rich sources of meaning and memory. Community experiences revealed the need for historically informed cleanups in processes such as Superfund and offered practical recommendations for community engagement. Together this dissertation highlights the importance of studying the social dimensions of post-industrial rural communities for more effective decision-making and community engagement.

DEDICATION

To the community of Anaconda, Montana. It was a privilege to hear your stories— thank you for sharing them with me.

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This dissertation is a product of a lot of people believing in me. I'm not sure how I will ever repay them, but I look forward to trying.

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Chapter 1: Introduction

Post-industrial towns in the United States are often described as "left behind" places. These communities include former areas of resource extraction like mining or timber and are often located in rural areas (MacKinnon et al., 2022; Ulrich-Schad & Duncan, 2018). Some of these towns economically lag behind their more urban counterparts, experiencing decline due to out-migration, lack of adequate funding, social services, and job opportunities, or chronic poverty (MacKinnon et al., 2022; Ulrich-Schad, 2018; Ulrich-Schad & Duncan, 2018). Others have capitalized on their natural amenities, striving to become destinations for tourism, recreation, remote workers, and retirees (Ulrich-Schad, 2018; Ulrich-Schad & Duncan, 2018). Many of these post-industrial rural communities continue to grapple with the effects of previous industries and extractive activities. Widespread contamination, pollution, environmental degradation, and hazardous materials in and surrounding their communities, further complicate their ability to attract new businesses or launch recreation campaigns (Colocousis, 2012; Messer et al., 2017).

This widespread environmental degradation and contamination, or legacy pollution from industries (Shriver et al., 2014), leaves visible scars across the country— removed mountaintops in West Virginia, orange-hued creeks with acid-mine drainage in Oklahoma, and 500-foot-deep pits filled with green water from uranium mining in Washington (Geranios, 2011; Lohan, 2021; Maples & East, 2013). The worst sites are classified as Brownfields (managed at the state level), where contamination and pollution impact the ability for expansion and development at existing properties, and federally managed Superfund sites, which are often abandoned former industrial sites or properties (EPA, 2016). Over 25% of Americans live within three miles of a Superfund site and 44% within three miles of a Brownfield (EPA, 2020a, 2020b). These contaminated sites

pose threats to the health and sustainability of nearby communities and ecosystems. The complexities of post-industrial rural towns, such as their identity, history, and memory, are intertwined with the challenges of addressing degradation and contamination cleanup, which have significant impacts on decision-making and planning for the present and future (Messer et al., 2015; Shriver et al., 2020; Skeard, 2015; Wheeler, 2014; Wilson, 2012).

This dissertation explores the intersection of contamination, legacy mining, memory, and change through a case study of Anaconda, Montana— a former smelting town, now Superfund site, and budding tourism and recreation destination. Specifically, I am interested in understanding the following questions:

- Does collective memory play a role in the community's ability to navigate change and plan for the future?
- How can collective memory influence decision-making and planning processes?

I accomplish this through these objectives: 1) describing the relationship between collective memory and community resilience; 2) examining the importance of temporality in post-industrial rural communities; 3) developing collective memory measures and a quantitative model; and 4) exploring the role of lived experience for Superfund community engagement.

Conceptual Framework

I draw on scholarship from post-industrial rural communities, community resilience, and collective memory to inform the conceptual framework for this research. I utilize the insights offered by geography, rural sociology, and community psychology to better understand Anaconda. The conceptual framework for this dissertation draws on extensive scholarship in

many fields and disciplines but assumes a pragmatic approach through theory and methods that is tailored toward the community.

A common theme studied in post-industrial rural communities is one of change or transition brought about by the collapse of natural resources, an industry significantly downsizing or closing, or the need for a contamination cleanup process. Economic geographers have focused on the over-adaptation of communities to one industry, structural constraints, and the impact on the local economy, but this approach gives less consideration to the agency of local communities (Smith, 2020). Historians have investigated community ties to an industry, often through the work of a company to retain power and control (Borges & Torres, 2012; Mercier, 2001). Community psychology and related fields have explored how community connections to an industry can spark reinvention of identities or galvanize action based on those identities (Bell & York, 2010; Keane, 2000; Skeard, 2015). Geographers, demographers, and sociologists have delved into the effects of amenity migration and land development for rural communities. These changes can create conflicts between environmental values and perceptions or result in population growth that presents affordable housing and employment difficulties for long time residents. Ultimately, these changes can have implications for community cohesion and development (Sherman, 2018; Ulrich-Schad, 2018; Ulrich-Schad & Duncan, 2018; Winkler et al., 2015).

Anthropologists and geographers have examined post-industrial landscapes— reading and interpreting mining landscapes, examining how industrial ruins evoke history and the past, exploring the meanings communities ascribe to landscapes, and studying how landscape preservation can acknowledge the broader social, cultural, and historical contexts (Beckett, 2021; Francaviglia, 1997; Kiessling et al., 2021; Langhorst & Bolton, 2017; Marsh, 1987; Wheeler,

2014; Wyckoff, 1995). Lastly, social psychologists and rural sociologists have sought to understand the community experience of living with and within contamination. They have examined the factors that contribute to the ability or inability to mobilize, risk perceptions and the mismatch between experience and technical data, psychosocial impacts of living near pollution or environmental hazards, and embodied experience and cultural knowledge as ways of knowing about contamination (Adams et al., 2018; Edelstein, 2018; Messer et al., 2017; Shattuck, 2021; Shriver et al., 2020). Overlapping scholarship from these fields has also investigated policy implications, including the Superfund program, energy policies (such as oil and gas development), rural restructuring, and local development policies (Guercio & Garman, 2022; Roemer & Haggerty, 2021; Woods, 2004).

Community resilience offers a lens to examine post-industrial rural towns, especially as risk and change affect the nature of communities (Faulkner et al., 2018). A community's resilience includes their ability to address problems, navigate change, and maintain a quality of life in the present and future (Berkes & Ross, 2013; Kulig et al., 2008, 2013; Magis, 2010; Norris et al., 2008). Post-industrial rural communities' resilience is important as it can support community survival, promote wellbeing and shared objectives, and enhance governance during slow burn and rapid changes (Aked et al., 2010; Imperiale & Vanclay, 2016; Pike et al., 2010; Sánchez-Zamora et al., 2014; Steiner & Atterton, 2015). Community resilience definitions are often normative in that communities should intend to be resilient with an emphasis on identifying strengths and building capacity (MacKinnon & Derickson, 2013; McAreavey, 2022; Mulligan et al., 2016). Scholars have identified characteristics or capacities that make communities resilient such as economic diversity, self-organization, leadership, social capital and networks, access to resources, and community participation (Berkes & Ross, 2013; Buikstra et al., 2010; Kulig et al.,

2008; Magis, 2010; Martin & Sunley, 2014; Norris et al., 2008; Wilson, 2012). While scholars have identified factors that can enable resilience in post-industrial rural communities, such as trust, connection to the land, social services, ability to work together in difficult times, and leadership (Lazzeroni, 2019; Markantoni et al., 2019; Matarrita-Cascante & Trejos, 2013; Schwarz et al., 2011; Sullivan et al., 2014), uncertainty remains regarding what makes some communities more resilient than others (Glass et al., 2022; McAreavey, 2022; Markantoni et al., 2019).

Carpenter et al. (2001) articulated a need to specify the resilience of what (the subject or level of analysis) and to what (the change or stressor) to better characterize resilience. The community is the level of analysis for post-industrial rural communities where the change or stressor can include the collapse or closure of an extractive industry. This can be followed by, or in addition to, other changes such as the implementation of new policies, an environmental or natural hazard, and socio-demographic shifts (Berkes & Ross, 2013; Cáceres-Feria et al., 2021; Kokorsch, 2017; Kruger et al., 2009; Kulig et al., 2008). While a myriad of methods (e.g., interviews, surveys, participant observation) and assessments (e.g., indices, scorecards, toolkits) are available to better understand or measure community resilience, more research is warranted. Specifically, there is a need to understand how communities assess and perceive their own resilience using mixed-methods empirical approaches (Ross & Berkes, 2014) and how social dynamics and historical connections impact their ability to plan for the future (Imperiale & Vanclay, 2016).

Collective memory, a concept used in a range of disciplines like history, sociology, psychology, geography, and anthropology, is helpful in the study of post-industrial rural communities. It refers to shared memories of individuals which contribute to group identity

(Hirst & Manier, 2008; Wheeler, 2014; Wilson, 2015). While social-ecological memory and social memory have been utilized in the resilience literature, collective memory extends beyond these concepts. An opportunity remains to bridge disciplinary divides and explore collective memory and community resilience in post-industrial rural communities (Adams et al., 2018; Hirst et al., 2018). Collective memory is defined as how individuals, as parts of groups or communities, remember/forget, (re)shape, transmit, and share knowledge, experiences, and information through traditions, public symbols, conversations, oral history, texts, or networks (Assmann, 2008; Foote, 1990; Hirst & Manier, 2008; Wertsch & Roediger, 2008; Wheeler, 2014; Wilson, 2012). Collective memory can be present in various ways— it can maintain a connection with the past which, dependent on the context, can help or hinder present and future decision-making and planning (Madsen & O'Mullan, 2013; Messer et al., 2015; Rawluk & Curtis, 2017; Van Assche et al., 2009).

Memory recall and identification at national and international scales has been pervasive in memory studies research (Abel et al., 2019; Öner et al., 2022; Schuman & Corning, 2012; Schuman & Scott, 1989). Research conducted at the community scale in post-industrial communities has illuminated divergent approaches to contamination, connections to former industries, the acceptability of new industries, and importance of industrial ruins and landmarks on the landscape (Adams et al., 2018; Keane, 2000; Messer et al., 2015; Wheeler, 2014; Wråkberg, 2019). While memory studies research has utilized numerous methods— surveys, interviews, document analysis, oral history, and experiments (Ariely, 2019; Carlson & Berkowitz, 2012; Coman et al., 2016; Muller et al., 2016; Wheeler, 2014)— a replicable quantitative measure has yet to be developed and tested. While not a replacement for in-depth and rich qualitative memory research, quantitative measures would allow for testing and

comparison across diverse contexts. For post-industrial communities especially, a better grasp of how the past impacts decision-making and collaboration will have implications for how communities look toward and plan for their futures.

Case Study Site

Anaconda, Montana: Smelter City, Superfund Site, and Gateway to the Pintlers

This research focuses on the community of Anaconda, part of the Upper Clark Fork Watershed in the state of Montana (Figure 1.0). In 1883, Marcus Daly, one of the "copper kings" of the colonial, early western U.S., established Anaconda as a location to process copper ore mined 26 miles southeast in Butte. He chose Anaconda due to its proximity to Butte and its ample supply of timber and water to fuel the smelter operation (Quivik, 1998). From 1883-1980, Anaconda was one of the main copper smelting operations in the United States (Morin, 2009). It was significant on the national and global stage, helping to electrify the nation and provide much needed copper during both World Wars (McLaughlin, 2020; NPS, 2022). The town was planned and laid out in a grid and developed with ambition— the ornate Montana Hotel was modeled after New York's Hoffman House, the Washoe Theater (now listed on the National Register of Historic Sites) was created in Art Deco style, and the public library was donated by Phoebe Hearst (Bryson, 2006; Gibson, 2022; Richards, 1996). From the late 1800s to 1970s, the population waxed and waned between 12,000 and 18,000 people (ADLC, 2019). Anaconda was one of the most ethnically and religiously diverse towns in Montana for some years (Montana Historical Society, 2022). Hosting 42 unions after World War II, the community facilitated a strong union culture by voting for union initiatives, frequenting union establishments, supporting workplace investigations, and upholding picket lines and boycotts (Mercier, 2001). In the 1950s, community members worked to make Anaconda a "city of unions," and with more bargaining

power, negotiated fair wages, political representation, and a code of conduct (Mercier, 2001, p. 79). Unions also fought for social programs and events that benefitted the broader community (Mercier, 2001).

Figure 1.0. Map of Anaconda, Montana. Source: Amy Katz.

In 1881, Daly started the Anaconda Mining Company (known locally as 'the Company'), which later became one of the largest mining companies in the world (Snow, 2003). Through various reorganizations and acquisitions, the Company had many different names (e.g., Anaconda Copper Mining Company, Amalgamated Copper Company, Anaconda Company), but functioned similarly throughout each iteration (Montana Historical Society, 2022). The influence of the Company was felt across the state, referred to as the "copper collar"— with power over journalism, state politics, and its workers. For decades, it also exercised its influence through its ownership of most state newspapers— owning seven of 10 major newspapers in the state until 1959 (Finn, 1998; Snow, 2003). It almost succeeded in making Anaconda the new Montana state

capital in 1894 (Bryson, 2006; McNay, 2008). The Company also pursued copper internationally, where it bought, owned, and operated various Chilean mines and mining companies as early as 1914 (Finn, 1998). The Company's reach extended beyond being the primary employer in Anaconda. It provided and maintained infrastructure, services (fire department, electricity, indoor plumbing and water, streetcar system), schools, buildings, public parks, and common spaces, and facilitated special events like the annual Christmas tree celebration (Bryson, 2006; Mercier, 2001).

The first smelter, the Upper Works, came online in 1884 with the capacity to treat 500 tons of copper ore per day, and five years later, a larger smelter, the Lower Works, opened and treated 2,500 tons per day (Curtis, 2013; Quivik, 2017). Both smelters operated together until the Washoe Reduction Works smelter opened in 1902 across town, boasting the ability to treat 8,000 tons of copper ore daily (Quivik, 2017). The Washoe Reduction Works utilized a 585-foot smokestack (hereafter 'the stack') to expel vast amounts of smoke from the operation (Quivik, 2017). The smoke from the stack produced widespread contamination from heavy metals emitted (e.g., arsenic, zinc, cadmium, copper) and deposited on buildings, residential lawns, parks and common spaces, and water sources— stretching across the Deer Lodge Valley and killing forests, agricultural crops, and livestock (Bryson, 2013; MacMillan, 1999). The smelting operation also produced large amounts of waste— flue dust, tailings, and slag— that was not properly disposed of and contaminated soils and water (EPA, 1994, 1998, 2011). In 1977, Atlantic Richfield bought the Anaconda Company and quickly closed the smelting operation three years later. The day the smelter closed, known locally as Black Monday, signaled a shift for those living in Anaconda (McNay, 1982).

In 1980, the U.S. Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) establishing the Superfund program to address contaminated areas in the United States (GAO, 2019). The program was enacted as a response to growing national concern about environmental contamination and hazardous waste in sites like the Love Canal (Tolan, 2008). Under CERCLA, the potentially responsible party, usually the owner (or previous owner) of a site, pays for the cleanup and works with the Environmental Protection Agency (EPA) and state agencies (GAO, 2019). In 1983, the EPA designated a 300-square-mile area adjacent to the town as the Anaconda Co. Smelter Superfund site. The Anaconda Superfund site is part of the Clark Fork River Superfund Complex (Figure 1.1), which includes other sites (Silver Bow Creek/Butte Area and Clark Fork River/Milltown Reservoir) and is one of the largest complexes in the United States (EPA, 2023; Quivik, 2007). Initially, due to the size and complexity of the Anaconda site, the EPA broke it into 16 operable units which were later combined into five active operable units (EPA, 2020c). Some of the operable units are further divided into subareas for management and efficiency (EPA, 2020c). For the Anaconda site, the potentially responsible party is Atlantic Richfield. As of 2019, Atlantic Richfield has spent $470 million on site cleanup (Barnes, 2019).

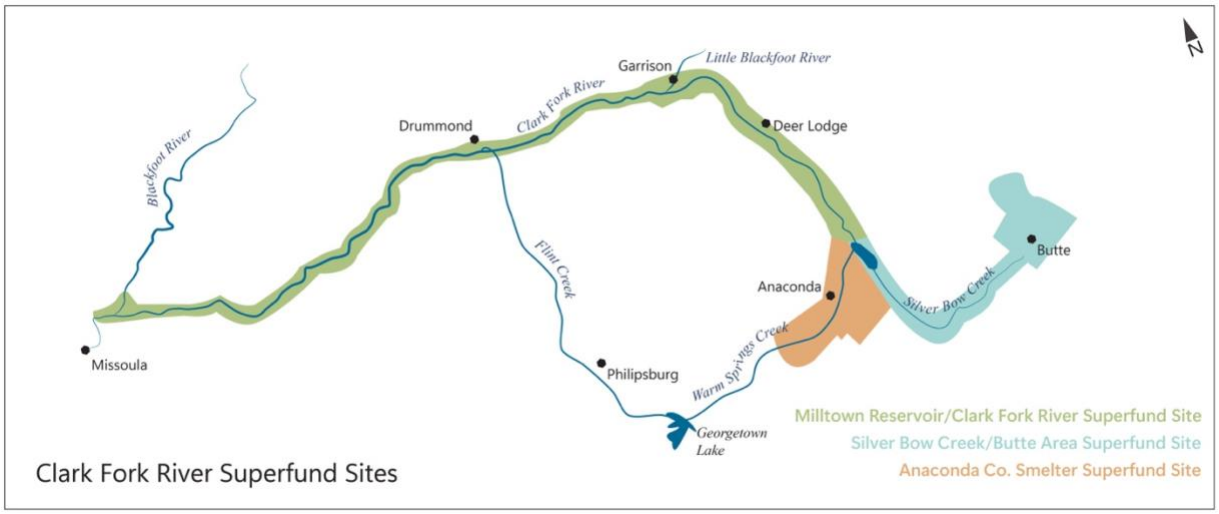

Figure 1.1. Map of the Clark Fork River Superfund Complex. Source: Amy Katz.

As part of the Superfund remediation, the smelter operation was demolished. However, citizens formed a group, "Anacondans to Preserve the Stack," to ensure the preservation of the stack. In 1987, the state legislature designated the stack and the area around it a state park (Kemmick, 1984; Simpson, 1985). Federally, it was also listed on the National Register of Historic Places (ADLC, 2021). Elements of the smelting operation are also visible in the Old Works Golf Course, an area capped and remediated within an operable unit. The course incorporated historic features such as smelting ovens, flue structures, and inert slag (EPA, 2007).

In 2020, the consolidated city-county government of Anaconda-Deer Lodge County and Atlantic Richfield reached a settlement agreement, which allocated $28 million for economic development and increased funding for an attic dust removal program, domestic well testing, waste in place measures, and blood lead testing (McCumber, 2020). This sum also included $3 million toward a new hotel in town, $2 million to renovate the Old Works Golf Course, and $1 million each year for 25 years for general economic development (Cast, 2021; McCumber, 2020). At the end of 2022, the EPA, U.S. Department of Justice (DOJ), Montana Department of Environmental Quality, and Atlantic Richfield reached an agreement that will govern the

remaining site cleanup and maintenance (Hooks, 2023). Atlantic Richfield will pay $83 million for future cleanup of hillside soils, residential yards, flue dust, and rock tailings, and $48 million to reimburse the EPA and DOJ for previous cleanup costs (Eggert, 2022; Hooks, 2023). The EPA and Atlantic Richfield aim to complete construction and remediation activities in the next four years (Hooks, 2023). The entire site will not be de-listed from the National Priorities List immediately but will take 5-10 years of monitoring with continuing maintenance and operation activities (Hooks, 2023).

Following the smelter closure and Superfund designation, many felt that the stigma of contamination and the lack of opportunities left Anaconda floundering. This was reflected in a declining population, with 3,000 residents leaving over the course of a decade, including many young people who left to attend college and did not return (Adams, 2023; Everett, 2022). The town also faced challenges in attracting and securing new business ventures (Adams, 2023; Everett, 2022). Some have suggested that the tide has turned in Anaconda, from being labeled a "sad sack smelting town" in the 1990s by Travel and Leisure magazine to recently a "county reborn" in Business View magazine (Adams, 2023). In the past decade, Anaconda has positioned itself as a tourism and recreation destination and prioritized development. One hundred and ninety-four new residents have moved to town, housing demand has resulted in sparse inventory, and median home prices have increased 37% in two years (Adams, 2023; Everett, 2022; Thorton, 2021). Large companies like NorthWestern Energy and Best Western have built a power generating station and hotel, respectively (Everett, 2022; Plaven, 2011). Local businesses have opened such as a brewery, yarn store, clothing boutique, several restaurants, and an automotive shop paralleled by an increase in 270 new jobs in 2022 (Emeigh, 2023; Everett, 2022). Anaconda's location offers ample access to outdoor recreation opportunities including the

Anaconda Pintler Wilderness, Georgetown Lake, and Discovery Ski Area. The Anaconda Trail Society has worked to invite recreationists into town, especially those hiking the Continental Divide Trail (CTD) which passes through the Anaconda-Pintler mountains, by receiving a designation as a CTD Gateway Community (Adams, 2023).

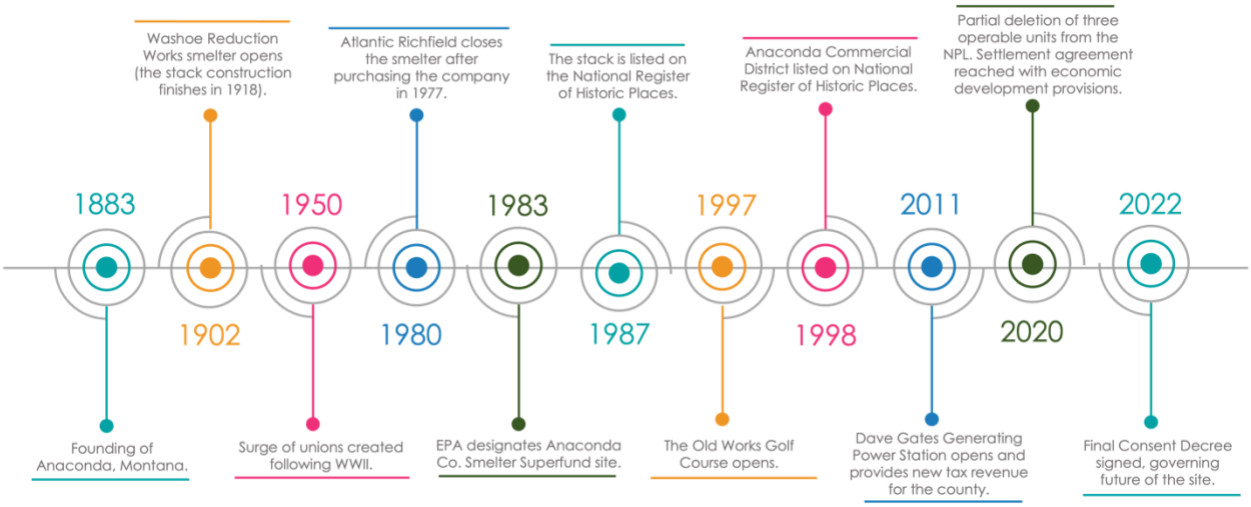

Figure 1.2. Timeline of Selected Events in Anaconda, Montana.

Methodological Approach

This research was born out of a desire to understand a community whose labels include post-industrial, rural, Superfund site, and budding tourism and recreation destination. What could this community teach us about its uniqueness and how does it relate to other communities in similar situations? I understand a community as comprised of people who live within the same geographic area, interact, have social ties, and share common resources (Matarrita-Cascante & Brennan, 2012; Wilkinson, 1999). Research conducted at the community level can help illuminate and address environmental and social issues and avenues for change that pave the way for or complement work at larger regional or national levels (Wilson, 2012). In this instance, I chose to focus on the community of Anaconda, as my research questions were focused on and able to be examined through this level of analysis (Beckley, 1998).

A mixed methods approach is problem-centric with an emphasis on research questions, rather than research methods motivating research design and questions (Hesse-Biber, 2010). Mixed methods research offers a pragmatic approach and includes qualitative and quantitative techniques, drawing on each technique's respective strengths (Tashakkori & Teddlie, 2010). The benefits of this approach include triangulation, or the use of multiple methods to examine a research question and strengthen conclusions, and development, where a research project is bolstered by previous data collection and findings (i.e., survey data informs interview questions) (Hesse-Biber, 2010).

In this dissertation, I used a mixed methods approach to operationalize my research questions that included semi-structured interviews, survey data, and phenomenological interviews. I drew on the breadth offered by survey data to illuminate relationships between variables and concepts and used interview data to understand the depth of meanings and values (Elwood, 2010). In addition, these methods were informed by each data collection effort; building on previous knowledge to help develop a robust and rigorous understanding of the phenomena being studied (Figure 1.3). By taking this approach, I was able to explore various aspects of collective memory, from its emergence in interviews, to gaining a broader understanding of how it influences the lives of community members and its implications for community change, and as a means to delve deeply into lived experiences.

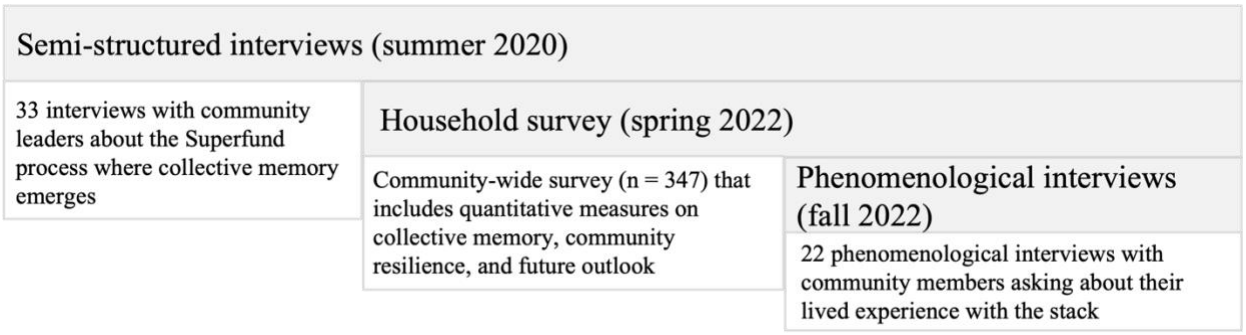

Figure 1.3. Mixed Methods Approach

In the summer of 2020, I conducted 33 in-depth, semi-structured interviews in Anaconda, Montana. Through multiple trips to the community and with the help of key informants, I gathered a list of potential interviewees; the list then expanded as interviewees provided suggestions of additional individuals (Hay, 2005). I spoke with community leaders or those directly involved in the Superfund process. The intent of these interviews was to understand community environmental issues, perspectives on the Superfund process and the entities involved, and the impacts of the process on their community. I began each interview with a set of introductory questions to learn about the community and its history more broadly— what brings people together, which sites or landmarks were considered important in their community, and what brings them pride about their community. The answers to these questions sparked a new direction for my research. Interviewees shared stories of the stack, the remaining feature from the smelting operation that towers over the town, as a landmark that perpetuates collective memories.

The semi-structured interviews provided one piece of information into collective memory, but I wanted to understand it on a larger scale. As part of the Consortium for Research on Environmental Water Systems (CREWS) NSF EPSCoR team, we developed a survey focused on community perspectives toward water resources and entities involved in the Superfund

process. The survey was disseminated to households in Anaconda between February and April 2022. We developed quantitative collective memory and future outlook measures and replicated perceived community resilience measures (Kulig et al., 2013) for the survey. Two open-ended questions asked respondents to list the three most important events in the last 100 years and the three most important places in their community. The development of these new measures allowed me to test them with established community resilience measures and examine their relationship.

Based on the first round of interviews and preliminary survey data analysis, I chose to further investigate the stack. The stack still played an important role in the community and produced tension for different individuals. Interested in the experience of living with the stack, I spent several weeks in Anaconda during the summer and fall of 2022 gathering data. I attended community events like Smeltermen's Days, an annual celebration that allows for entry to the stack, and regularly visited local establishments. Through these encounters and with the help of key informants, I created a list of potential interviewees that lived in Anaconda when the smelter was operational and after it closed. I conducted 22 phenomenological and semi-structured interviews between August and October 2022. Apart from a standard opening question, phenomenological interviews offer an unstructured and open-ended conversation for interviewees to share their stories. This approach seeks to uncover what is meaningful in a specific lived experience (Pollio et al., 1997). To complement the phenomenological portion, 11 semi-structured questions were asked at the end of each interview. To be reflexive, I recorded field notes after each interview to reflect on my motivations, questions, and position and their effects on interviewees and data collection (Berger, 2015). The interview transcripts were analyzed individually and collectively as part of a research group.

Positionality

An important aspect of place-based research is recognizing and articulating my position and identity as a researcher and the relationship to my work (McDowell, 1992; Rose, 1997). Reflexivity is the evaluation of the researcher and how her positionality (i.e., where I am coming from) affects the research process and outcome (Berger, 2015; Holmes, 2020). It highlights that knowledge that is not objective nor is its production separate from the researcher (Berger, 2015; Holmes, 2020). Reflexivity and self-reflection are both necessary and ongoing processes that allow for awareness and investigation of our positionality (Holmes, 2020). A consideration for researchers when they situate themselves in a community is how community members will perceive them and how they access a community (Folkes, 2022). There has been a move away from the insider and outsider debates toward the recognition that positionality is more nuanced and can shift throughout the research process— it is "relational, contextual, and continually evolving" (Barnes, 2021; Folkes, 2022, p. 3). Considering positionality provides clarity about the motivations for my research and attempts to move beyond the "shopping list" (e.g., race, ethnicity, education) of how I am similar or different to those in the community (Folkes, 2022; Macfarlane, 2021).

As a researcher, I take an interdisciplinary approach. I appreciate the space, place, and temporal lenses emphasized by geographers as well as their interest in landscapes. I also draw on scholarship from rural studies, rural sociology, community psychology, natural resource management, and social-ecological systems. My greatest weakness as a researcher is that I struggle to identify as an expert, but this shortcoming also allows me to feel comfortable asking questions and learning from others, especially those outside of academia. I strive to conduct research from a place of empathy before anything else, which I hope builds trust and

relationships rather than knowledge extraction. In some cases, I may leave questions on the table during conversations when I sense it is too emotional or uncomfortable to continue.

This research emerged primarily out of my deep love and connection with the American West as a whole, but more specifically, my desire to learn about and from rural and place-based communities, especially those experiencing changes such as climate change, economic transition, and widespread contamination. I am, by no means, someone with any experience being rooted in place or rurality. Before moving to Montana for my graduate studies, I lived in five states in four years, crisscrossing the West and parts of the Midwest each field season. I grew up in what I thought was a medium-sized suburb of Chicago, Illinois, only to land in Montana and learn it dwarfed the largest city of Billings. I have been drawn to this work particularly because it is something so different from my own experience. "Home" is still a work in progress for me, I identify more with and have felt attached to Montana than in previous places, which perhaps drives so much of my interest in the communities within the state.

Throughout my fieldwork, my identity felt challenging to navigate at times. I have had dozens of conversations and interviews with people who ask, "where are you from originally?" My response, "I live in Missoula," often felt disingenuous, but at the same time, people often shut down or were less interested in talking to me when I said I was from, but had not lived for many years, Chicago or Illinois. I was also frequently asked, "what did you do before this?" For some years before graduate school, I was the environmentalist who only saw black and white, the one who showed up in state capitols and canvassed neighborhoods against extractive industries. Time has afforded me the wisdom to see the nuances and subtleties within these conversations, especially related to contamination, livelihoods, and place. This research has opened my eyes to the dissonance we all hold, some of which make more sense when you

acknowledge the judgment you arrived with. I also have questioned the extent of ourselves that we are obligated to share as researchers— we do not show up to other social interactions and expose all pieces of us at once. I tended to maximize space for others during our interactions rather than feeling I was sharing too much. Finally, I have grappled, and continue to grapple, with the fact that I study rural and post-industrial communities but am not drawn to living in one and what the implications of that separation are for me and my research.

Dissertation Overview

This dissertation is organized into three distinct chapters followed by a conclusion chapter. Chapter Two links community resilience and collective memory and finds that collective memory has an important, but under-researched, impact on resilience. In Chapter Three, I examine how community resilience and collective memory influence communities' decisions and perceptions in the present and future through the development of a quantitative model. Chapter Four addresses the need for enhanced Superfund community engagement strategies through the incorporation of a historical approach exemplified through the community's lived experiences. I conclude in Chapter Five by synthesizing the findings across the three main body chapters and examining their contributions to scholarship.

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Chapter 2: Connecting Collective Memory and Community Resilience: A Case Study of Anaconda, Montana

Abstract

Post-industrial communities across the world are transitioning from industrial economies and identities to an uncertain future. Their successful transitions depend on communities' abilities to navigate change and maintain a quality of life, or their community's resilience. Previous scholarship offers insight into the resources and capabilities that facilitate or inhibit community resilience such as leadership, social capital, and information. However, collective memory is not well integrated within the community resilience literature. Drawing on data from interviews with 33 community leaders in the town of Anaconda, Montana, we illuminate the impact of collective memory on community resilience. The Anaconda Co. Smelter Stack stands out as a specific landmark and prominent feature of the built environment that perpetuates particular collective memories in Anaconda. We find that collective memory is an integral part of community resilience, where memories can aid in a community's recovery and rebuilding or constrain thinking and divide viewpoints. We argue that ignoring collective memory's connections to resilience can undermine efforts to face changes in these communities.

Introduction

Post-industrial towns are undergoing transitions and faced with the looming question—"now what?" Once robust extractive industries that served as the lynchpin of communities, both socially and economically, have left. As some communities position themselves as recreation or tourism destinations, others struggle to redefine themselves. The success of these communities hinges on their ability to address problems and navigate changes in the present and future, or the community's resilience (Berkes & Ross, 2013; Kulig et al., 2008, 2013; Magis, 2010; Norris et

al., 2008). Key factors (e.g., leadership, networks, information) facilitate and contribute to a community's resilience (Berkes & Ross, 2013; Buikstra et al., 2010; Magis, 2010; Norris et al., 2008; Wilson, 2012), but current scholarship falls short in integrating an essential component, collective memory, into the conversation.

Collective memory can strengthen community resilience scholarship. It serves as a way for communities to share knowledge and experiences through conversations, public symbols, or traditions (Assmann, 2008; Hirst & Manier, 2008; Wertsch & Roediger, 2008; Wheeler, 2014). Collective memory is both time and context dependent— it may act as a critical strength or play a more complicated role in community resilience. The remnants of a mining landscape, especially prominent landmarks contribute to and perpetuate collective memories (Wheeler, 2014). We posit that collective memory directly impacts community resilience and understanding both together will enhance the usefulness of resilience research. If collective memory remains unexamined, we run the risk of undermining resilience efforts. While our work focuses on post-industrial communities, we see value and implications for communities beyond that scope.

Anaconda, Montana provides a case study of a town grappling with change in a post-industrial mining era. Once a copper smelting giant for both the state and the nation, and now the locus of one of the largest Superfund sites in the country, the community has set its sights on becoming a recreation destination in southwest Montana (Quinn, 2021). While a vast cleanup effort has brought changes across the landscape, the 585-foot smelter stack was saved from demolition and remains visible across town. This poses the question of how or if a community can move forward, harness resources, and implement change when the past continues to be on display.

We first discuss the relevant community resilience and collective memory literature and their intersections. We then draw on interview data to illuminate how collective memory functions and impacts community resilience in Anaconda, Montana before providing insights for post-industrial communities and beyond. Our study is guided by the questions: what is the connection between collective memory and community resilience; and how do collective memories act as anchors or facilitators of community resilience? Our research answers Vaneeckhaute et al.'s (2017) call for more empirical work on how collective memory affects resilience and decision-making.

Literature Review

Community Resilience

The concept of community resilience serves as a boundary object between diverse disciplines and fields (Brogden et al., 2022). We draw on the integrated approach to community resilience offered by Berkes and Ross (2013) to examine resilience at the community rather than individual or system scale. As Buikstra et al. (2010) found, characteristics that promote resilience are not solely found in individuals or in the community but are interconnected. We aim to understand the specific social processes in a community and acknowledge the interdependencies between how those social processes came to be within a larger environment of contamination and cleanup. We also recognize the normative nature of the concept of community resilience, which often results in prescriptions of what should be or is more desirable for a community as a whole (MacKinnon & Derickson, 2013; Mulligan et al., 2016).

Community resilience aims to understand the resources and capacities a community has to move forward from an economic, political, or environmental change (Berkes & Ross, 2013; Magis, 2010; Norris et al., 2008). Capacities include narratives, attachment and sense of place,

information, community participation, beliefs, learning, leadership, social capital and networks, economic development, and resource access (Berkes & Ross, 2013; Buikstra et al., 2010; Kulig et al., 2008; Magis, 2010; Norris et al., 2008; Wilson, 2012). Community resilience is often understood as a theoretical framework, a set of capacities that contribute to resilience, and a process, where the resiliency of a community is dynamic and a series of responses (Kulig et al., 2008, 2013; Norris et al., 2008).

Case studies in other post-industrial towns provide a roadmap for defining community resilience in these areas. Post-industrial communities often exist in rural and remote regions and lack alternative industry options (Skeard, 2015). After the mining company left a rural town in Newfoundland, the community drew on their shared identity as survivors, social cohesion, and attachment to the mining landscape (Skeard, 2015). These capabilities fueled the creation of local community groups and propelled forth leaders. Community groups facilitated economic adaptation by securing funding and implementing development projects (Skeard, 2015). Services (i.e., health, education, social services, municipal) also serve a critical function for communities as they navigate change (Sullivan et al., 2014). A town in British Columbia responded to a mine closure by utilizing strong community cohesion and social capital to form a task force which focused on providing services and stabilizing infrastructure (Sullivan et al., 2014). The task force purchased and sold inexpensive homes in the community (which also attracted new residents and increased the tax base) and obtained funding to maintain or increase other services (Sullivan et al., 2014). However, some residents were resistant to economic diversification and hoped for similar industry projects to fill the gap (Sullivan et al., 2014). Similarly, in three post-industrial towns in Europe, an emotional connection to the industrial past negatively affected a community's willingness to change (Lazzeroni, 2019). At the same time, local institutions

initiated development projects and offered services which facilitated change (Lazzeroni, 2019). A tension emerged across the three case sites, where homage to an industrial heritage could enhance or diminish resilience (Lazzeroni, 2019). For example, the creation of an industrial heritage-based museum generated community engagement and promoted new narratives, created nostalgia, and increased the desire to look to the past rather than the future (Lazzeroni, 2019). A comparative case study in two Costa Rican communities examined factors that contribute to resilience as they experienced transitions from extractive to tourism economies (Matarrita-Cascante & Trejos, 2013). They found that the ownership of resources, an entrepreneurial drive of community members, community agency (interest in working toward community improvement over individual interests), and flexible institutional arrangements (and the services they provided) enabled one community to respond to changes (Matarrita-Cascante & Trejos, 2013).

Collective Memory

The previous case studies and community resilience scholarship have not incorporated the concept of collective memory. Some resilience research has integrated social memory (Adger et al., 2005; Colten & Sumpter, 2009; Wilson, 2012) or social-ecological memory (Barthel et al., 2014; Folke et al., 2002), but we contend that collective memory extends beyond these concepts. Collective memory has emerged from disciplines such as sociology, history, geography, anthropology, and psychology (Olick et al., 2011). Vaneeckhaute et al. (2017, p. 13) describe collective memory as "the active past that forms our identity." Said differently, collective memory is "the connective structure of societies" (Assmann, 2011, p. 267). Collective memory refers to shared memories of individuals which contribute to group identity (Hirst & Manier, 2008; Wheeler, 2014; Wilson, 2015). Therefore, collective memories are not merely shared

memories but require an "identity shaping function" (Coman et al., 2009, p. 129). For example, a shared memory may include knowing the ABCs or the value of pi, while a collective memory for an American may include the 9/11 terrorist attacks (Coman et al., 2009; Roediger & Abel, 2015). We define collective memory as how individuals, as parts of groups or communities, remember/forget, (re)shape, transmit, and share knowledge, experiences, and information through traditions, public symbols, conversations, oral history, texts, or networks (Assmann, 2008; Foote, 1990; Hirst & Manier, 2008; Wertsch & Roediger, 2008; Wheeler, 2014; Wilson, 2012). Collective memory is the nexus of social identity and historical memory (French, 1995), where memory is "part of the symbolic foundation of collective identity, where the question, 'who we are,' is answered, at least partially, by answering the question, 'where do we come from'" (Foote & Azaryahu, 2007, p. 127). Collective memory forms through interactions between an individual, society, and public display (Coman et al., 2009; Hirst & Manier, 2008; Olick, 1999). In this way, "there is no individual memory without social experience nor is there any collective memory without individuals participating in communal life" (Olick, 1999, p. 346).

Collective memory likely impacts community resilience in various ways. It can "promote group legitimacy, connect past and present, enhance a sense of 'we-ness,' and empower and display a uniqueness of a group's cultural heritage" (Messer et al., 2015, p. 5). Rawluk and Curtis (2017, p. 951) note that collective memory can directly impact decision-making "because it connects a society to the past, but it can also act as a window into the future." In contrast, Van Assche et al. (2009) argue that collective memory hinders local planning efforts due to an attachment to the past along with unrealistic expectations and desires— where a fixation on one time period leaves the community unable to see different future narratives or scenarios. Madsen

and O'Mullan (2013, p. 62) add that collective memory "plays a very practical role in helping or hindering the community to respond to adverse situations."

Case studies of post-industrial towns have utilized a collective memory lens (e.g., Keane, 2000; Messer et al., 2015; Wheeler, 2014; Wråkberg, 2019), but have not explicitly connected it to community resilience. Across these studies, mining communities felt more connected to their industrial histories or pasts when features of the landscape were visible. Messer et al. (2015) used collective memory to examine two former mining towns' contamination approaches. In one Colorado community, a zinc smelter functioned as the primary industry for 80 years before closing in the 1970s. The collective memory of the smelter was associated with better times, community values, economic prosperity, and rurality— where the current contamination was a tradeoff for economic progress (Messer et al., 2015). Alternatively, in a town in Oklahoma, a uranium plant was never seen as part of the community, but rather something that polluted the landscape. Community members' collective memory about pollution was in direct opposition to their values and led them to protest the company creating a waste site in their town (Messer et al., 2015).

Two former mining communities in Colorado pivoted to previous economies, like ranching, rather than trying to market their mining identities (Keane, 2000). In these communities, underground mining left less visible scars across the landscape and the industrial equipment was removed once the industry left (Keane, 2000). Wråkberg (2019) applied collective memory as a lens to assess transitions in the mining town of Kirkenes, Norway. Collective memory influenced the social license that residents gave new mining companies and impacted local opinions and decision-making (Wråkberg, 2019). Wheeler (2014) found that the landscape of a former mining town in northwest England evoked and shaped collective

memories. Structures or remnants from the mining era, like a slag pile or railroad tracks were repurposed or left to waste away. Many of these landmarks or ruins were informal in that there was no specific remedy for preservation or plan to clean them up, which allowed for various understandings and collective memories of these sites, which shifted and transformed over time (Wheeler, 2014).

Communities construct or preserve landmarks and historical monuments to create unity or a specific narrative of the past (Otterstrom & Davis, 2016). The physical embodiment of landmarks or monuments can contribute to various collective memories. These collective memories may provide a counter-narrative when assessing the landscape for restoration or environmental cleanup. Robertson (2006, p. 2) suggests that mining has created a "stigmatized symbolic landscape," where "mineral extraction and processing areas… have become icons of dereliction and decay. For those who live in these places, however, these landscapes may function as meaningful communities and homes." Beckett and Keeling (2019, p. 219) concur, "remediation projects rely on narratives of toxicity and containment, often forgoing discussions on heritage, remembering, and healing." Langhorst and Bolton (2017, p. 164) add that the main objective in Superfund sites involves a standardized cleanup response to mitigate risk which fails to address "the particular socioeconomic and cultural contexts" across landscapes. Landmarks in these landscapes may impose memories on a community— influencing a community's resilience. Proponents of landmark preservation aim to commemorate the past and provide something for future generations, which may neglect how the physical structure affects a community in the present (Milligan, 2007). Landmarks and other historic resources can act as stabilizing forces "during times of crisis and help to preserve community identity even in the face of traumatic change" and promote economic development (Appler & Rumbach, 2016, p. 1).

Case Study Site

Our research focuses on the community of Anaconda in southwest Montana. We see a community as people that live within the same geographic area who interact, have social ties, and share common resources (Matarrita-Cascante & Brennan, 2012; Wilkinson, 1999). In 1883, Marcus Daly, one of the "copper kings" of the colonial, early western U.S., established Anaconda as a location to process copper ore from Butte. He chose Anaconda due to its proximity to Butte and its ample supply of timber and water to fuel the smelter operation (Quivik, 1998). In 1881, Daly started the Anaconda Copper Mining Company (the Company), which later became one of the largest mining companies in the world (Snow, 2003). The Company used its power in state politics, where it almost succeeded in making Anaconda the new state capital in 1894 (Snow, 2003). For decades, it also exercised its influence through its ownership of most state newspapers (Snow, 2003).

The smelting operation in Anaconda transformed the landscape (Bryson, 2013; MacMillan, 1999). In 1884, the Old Works smelter opened and processed five times as much ore as the smelter in Butte (Bryson, 2013). Eighteen years later, the Washoe Reduction Works smelter opened, processing 8,000 tons of copper per day and a new 585-foot smelter stack that expelled fumes and gasses from the operation (Bryson, 2013; Quivik, 1998). The smelter smoke contaminated and killed forest patches, agricultural crops, and livestock throughout the Deer Lodge Valley (Bryson, 2013; MacMillan, 1999). Airborne emissions released heavy metals into soils and water sources. The Company disposed of smelter waste materials in various ways— as fill for railroad beds, driveways, or foundations (EPA, 2019). In 1983, the Environmental Protection Agency (EPA) designated a 300-square-mile area adjacent to the town as the Anaconda Co. Smelter Superfund site.

In 1980, the U.S. Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) establishing the Superfund program to address contaminated areas in the United States (GAO, 2019). The program was enacted as a response to growing national concern about environmental contamination and hazardous waste in sites like the Love Canal (Tolan, 2008). Under CERCLA, the potentially responsible party, usually the owner (or previous owner) of a site pays for the cleanup and works with the EPA and state agencies (GAO, 2019). In the case of Anaconda, the potentially responsible party is Atlantic Richfield, who purchased the Company and the smelting operation in 1977. In 2020, the consolidated city-county government of Anaconda-Deer Lodge County and Atlantic Richfield reached a settlement agreement, which allocated $28 million for economic development and increased funding for an attic dust removal program, domestic well testing, waste in place measures, and blood lead testing (McCumber, 2020). The EPA, U.S. Department of Justice (DOJ), Montana Department of Environmental Quality, and Atlantic Richfield recently reached an agreement where Atlantic Richfield will pay $83 million for future cleanup of hillside soils, residential yards, flue dust, and rock tailings, and $48 million to reimburse the EPA and DOJ for previous cleanup costs (Eggert, 2022).

Methods

We conducted 33 semi-structured interviews with community leaders in Anaconda during the summer of 2020. Due to COVID-19, interviews were conducted remotely, either via Zoom or by phone; interviewees chose which platform worked best for them. We began by interviewing people on a list of names gathered from preliminary trips to the community to speak with key informants. Potential interviewees were community leaders or those directly involved in the

Superfund process. This list then expanded through chain referral sampling, as interviewees provided suggestions of community leaders to also speak with (Hay, 2005).

We used an interview guide (Appendix A) as the broad framework for asking questions, which allowed some flexibility (Hay, 2005). This structure enabled us to follow up or probe interviewee responses that were of interest or are particularly revealing (Hay, 2005). Interviews ranged from 21 minutes to 2 hours each, with an average interview lasting around 65 minutes. Most interviewees had lived in the community (though not always continuously) for 36 or more years (n = 16), others lived in Anaconda for 16-35 years (n = 10), and a minority of interviewees (n = 5) lived there 15 years or less.

Interviewees were emailed the consent form to look over before the interview. Interviews began with a brief restatement of the project, followed by obtaining the interviewee's verbal informed consent. However, if interviewees did not read the consent form or wanted clarification, we read it to them or discussed pertinent sections. Interviewees gave verbal approval for the interview to be recorded and were reminded their interviews would be kept confidential. The interview process and guide were approved by the University of Montana Institutional Review Board (IRB Protocol Number 23-20).

We coded interview transcripts following thematic analysis (Braun & Clarke, 2006). The first round of coding took an inductive approach. We developed a codebook by reviewing three interviews and creating a list of general codes that emerged from the data. We then coded two additional interviews and modified the codebook. We coded the rest of the interviews based on this coding scheme using NVivo 12, a digital organizing platform for qualitative analysis. These codes were then reviewed and aggregated into potential themes. The second round of coding

took a deductive approach and focused on themes of collective memory and community resilience.

Results

Interviewees mentioned various sites and events that evoked collective memory. All interviewees mentioned the Anaconda Smelter Stack (hereafter 'the stack') as a landmark and physical embodiment of memory, which imposed particular collective memories on the community. The theme of the stack as an anchor to the past emerged throughout the interviews. We organize the results into two sections: the stack as an anchor and the impact of collective memory on community resilience.

Table 2.0. Interviewee Profile. Interviewees' Current or Previous Professional Affiliations.

Affiliation	Number of Individuals
Government Position	11
Nonprofit Organization	3
Business	8
Environmental Work	5
Civic/Volunteer Organization	6

Interviewees were eager to talk about the stack as a physical structure and its meaning in the community. Some interviewees were quick to point out that the stack was "the largest free masonry structure in the world" (Interviewee 15). The stack looms over Anaconda and is visible from highway I-90, 30 miles away from town. As one drives into the east side of town, it stands out over the valley, or as one interviewee said, "We're in the shadow of the stack" (Interviewee 1). While another said, "the big stack sitting out on the edge of town is hard to ignore" (Interviewee 7). Beyond its physical characteristics, many interviewees saw the stack intimately tied to their history, mining culture, and identity. Interviewees expressed pride in their history

and mining culture. One interviewee said, “we’re very proud of our mining history. Miners work extremely hard, they’re very industrious” (Interviewee 10). Others talked about the deep connection between the stack and the community. As one interviewee said, “that is Anaconda, the stack. It is, it’s every person that lives here” (Interviewee 18). While another added, “Well the stack is a reminder of roots” (Interviewee 29).

Anchor to the Past

The stack emerged as an anchor to the past in that it kept the community reminiscing about what it represented and was formerly capable of, hindering economic, cultural, and social change. Five sub-themes were evident within the larger theme of the stack as an anchor: holding out hope, a reminder of better times, a connection to history, culture, identity, and family, a life source, and a source of contamination and loss.

Holding out Hope

Interviewees thought that the generation that worked on the stack, most who were 65 years or older, waited for smelting to resume after the operation was shuttered in 1980. They were holding out hope. One interviewee said, “It’s taken decades for some of those old timers to realize that [the smelter re-opening] is not going to happen” (Interviewee 5). Another added that the older generation still clung to the idea of the smelter, “I think they wanted that smelter to open up… to this day, they probably want that smelter to reopen” (Interviewee 19). The older generation’s disbelief in the abrupt closure of the smelter operation often manifested in uninterest to envision a new path for the community. One interviewee remarked, “I look at the stack as this double-edged sword. It is definitely a connection to the past and in some ways, it is a bit too much of an anchor to the past that has kept a lot of people, at least their thinking, from

moving forward" (Interviewee 5). A different interviewee took a stronger view of how the stack kept Anaconda in the past, "I'll be honest with you, you need to take the stack down… Anaconda is still waiting for that stack to start belching smoke again" (Interviewee 10).

A Reminder of Better Times

The stack reminded the community of better times. These better times were often classified economically, in terms of the smelter operation providing an economy and jobs for the town, and the overall importance of Anaconda on the national stage. The visual appearance of smoke coming out of the stack denoted the smelting of copper and directly related to miners' livelihoods. One interviewee commented, "I think the way that I grew up, if there was smoke coming out of the stack it represented prosperity" (Interviewee 12). The smoke from the stack was a powerful indicator of both jobs and a certain type of company town, where there was stability. One interviewee said that the community felt "taken care of as long as there was smoke coming out of that stack, people were working" (Interviewee 5).

The stack served as a reminder of the influence and impact of mining in the 20th century. The copper mined in Butte and smelted in Anaconda was responsible for supplying the needs of the U.S. and the world. The stack reflected the importance of copper, and by association, Anaconda for advancing electrical and military needs for the U.S. One interviewee spoke of the inherent connection between copper and the stack, "When you think about the copper that came out of Butte and Anaconda that copper basically served to electrify much of the eastern U.S." (Interviewee 10). The copper smelted in Anaconda was critical for various military efforts. One interviewee added, "This town contributed greatly through the effort that went into transforming all the car factories into factories that made planes, trains, and trucks in WWII. The copper from the smelter was essential to that" (Interviewee 29).

The importance of copper mining during this time period led interviewees to comment on the overall impact it had on Anaconda. The stack was "a reminder [that] we were a little more economically important city back then" (Interviewee 16). Similarly, the stack reminded another interviewee that "we were a focal point for industry both in Montana and for the U.S. for the generation of copper, and we were financially very important at that time to the entire U.S. Economically, we were very important" (Interviewee 30).

A Connection to History, Culture, Identity, and Family

The historical and cultural connection interviewees felt to the stack continued to define their relationship with mining and their identities. As one interviewee noted, "I think it represents the culture that we have here. We really are unique, it makes us unique" (Interviewee 11). Interviewees' relationship to the stack stemmed from when they or their families worked at the smelter. One interviewee said, "I think the aging generation is really attached to it, and to them, it's the sign of their history and their culture and what they did here" (Interviewee 6). Another interviewee saw the stack as deeply connected to their family roots, who had lived in Anaconda for multiple generations, "So myself, my family had ties to the Anaconda Company, so the stack is certainly a positive image in my mind and most of the folks I grew up with" (Interviewee 25).

Interviewees expressed the importance of preserving the stack. They felt that their history required a physical symbol to remember and celebrate it. One interviewee said, "But people wanted to hang onto the stack to preserve a part of the history of Anaconda" (Interviewee 12). Interviewees often compared the need to maintain the stack to other communities in Montana or Idaho that had torn down their smokestacks after the industry disintegrated. However, residents in Anaconda fought to make the stack and the surrounding area a state park. One interviewee discussed this effort, "I know when the smelter shut down there was a group of residents that got

together and formed the Save the Stack Committee. And they ended up getting it designated as a state park so that they were able to keep it as part of the heritage" (Interviewee 14).

A Life Source

The desire to preserve and maintain the stack denotes an inextricable link to the existence of their community. A few interviewees spoke of the stack as the genesis of the community and their families. They said, "it's why we're here" (Interviewee 18), "the reason for Anaconda to exist was the smelter" (Interviewee 2), and "...[we] saw the smelter as this huge life source essentially" (Interviewee 25). The first interviewee elaborated on these perspectives saying, "They have talked about tearing it down because it has asbestos. Well, cap it. They can't get rid of it, it is Anaconda" (Interviewee 18). Another interviewee added that the stack reflected a sense of place, "I knew I was home because I could see the stack in the distance" (Interviewee 1).

Source of Contamination and Loss

The collective memory around the stack as a source of contamination and loss hinted at the complexity and polarization of the stack for some residents. It also explicitly highlighted the generational divide and divide between new and long-term residents. Interviewees acknowledged that for older generations, those who had lived in Anaconda for many years, or whose families had worked at the smelter, the stack connected them to their history. For some, this connection was expressed negatively due to the abrupt closure or the economic downturn that followed. One interviewee said, "About a third of the old timers you talk to, they'll say the shape of the mountains around the stack make it look like a great big middle finger that's pointing at the community" (Interviewee 30). Newcomers and younger generations were confused by the loyalty to the stack. One interviewee commented:

> But the more new folks you're seeing come through Anaconda, it's like well this is a symbol of the damage that was done to this community environmentally and why would you keep it held so sacred. So you've got both opposing views… Both this is tied into my family, this is part of who we are. And the newer view, which is that it's a symbol of the past, a symbol of damage (Interviewee 25).

Another interviewee elaborated on this sentiment and said:

> I think there is a cadre of older people or people whose families go back a long way in Anaconda. And there's a tremendous amount of pride in the stack, and the history and the toughness of the people that it represents. I think on the other side, there are people that have moved here more recently, and/or younger people that don't feel that connection with the stack. And to them, they see it as a monument to our industrially contaminated past. I think some see it as a big neon sign advertising how contaminated the town is (Interviewee 28).

The stack contributed to collective memories that anchored Anaconda to the past. Interviewees wanted to return to when the smelter was running, longed for more prosperous economic times, held on to the historical and cultural connection to the stack, and experienced a disconnect in collective memory between generations. Collective memory offers insight into how the stack may influence the ability of Anaconda to move forward and transition, which has implications for the community's resilience.

The Stack: A Connection to Resilience

The collective memory of the stack related to the community resilience of Anaconda in two distinct ways. Collective memories about the reliance on mining and the Anaconda Mining Company captured the community's feelings of reluctance to change and adapt after the smelter closed. At the same time, the community considered itself resilient. For Anaconda, collective memory influenced their perceptions of community resilience, and thus, their capabilities to embrace a new identity and economy.

The reliance on the Anaconda Mining Company— a powerful force in Montana and the world for many years— left the community less able to change due to mentality or lack of understanding. Much of the community still saw the mining industry as tied to the economic boom and their identity, which left them only considering a different industry as the solution. One interviewee offered that Anaconda just wanted a different industry to move forward, "I think Anaconda is still kind of stuck in the past with the way they think of industry" (Interviewee 19). Another interviewee took a more forceful stance about how the community's mentality about the past:

> The older generation really is holding us back here. Holding us back a lot. They really are stuck in the past, they're stuck in the smelter's heyday in the '60s and '70s and it is heresy here to say the smelter is gone and it is not coming back. I mean it is like you're killing someone's sacred cow to say that (Interviewee 30).

While many expressed that the mining mentality ruled in Anaconda, others did see that change was necessary. One interviewee offered this perspective:

> I think some of the old mentality of the smeltermen's days where they depended on the smelter to take care of things for them is still somewhat prevalent. But I think people are realizing that for us to get things done we need to do them ourselves and not depend on a one company town and that company to take care of everybody and all of their needs (Interviewee 17).

The Anaconda Mining Company not only provided the industry and job opportunities in town, but also built and maintained infrastructure such as roads, buildings, and streetlights. The Company developed and maintained community amenities such as parks, common areas, and a theater. They also hosted yearly community parades and events. One interviewee described this relationship as one of dependence on the company, "It took a long time for the mindset [to change] of oh somebody is going to come and rescue us. What are we going to do, the Anaconda

Company abandoned us, so poor us, we're not going to survive" (Interviewee 1). While another interviewee elaborated on the community and economic structure provided by the company:

> The ability to adapt, there was never really an entrepreneurial spirit here it seemed like while the Anaconda Company was here because it wasn't needed. You basically either worked for the company, the smelter, or you provided goods and services to the people that lived and worked here. And it all was relatively predictable, uniform, unchanging over the years. And when that went away people didn't know what to do. To some extent, there may still be an element that is struggling with that. You have a company that was the sole purpose for this town to exist and it operated for 97 years here. When that lifeblood goes away… that leaves a lot of people paralyzed not knowing what to do (Interviewee 5).

The collective memory of the stack left the community stumbling to find or reinvent itself forty years later. One interviewee said, "Anaconda has had to learn how to not be dependent on one huge company. It's taken us a while to learn who we are now with that one company town gone. So, we've struggled to find ourselves, but it's happening. Anaconda is really coming into its own. It's taken a while" (Interviewee 11). Another interviewee concurred, "I think Anaconda is still evolving and still trying to find itself after the smelter closed in 1980" (Interviewee 15). A slow process occurred throughout both the community and environment in Anaconda. Exemplified by one interviewee: "I honestly believe, Anaconda is in a rediscovery mode right now… And that will lead to prosperity in the future. It'll take some more time" (Interviewee 8).

While Anaconda struggled to change and move forward, interviewees also saw their community as resilient since the smelter shut down. One interviewee stated, "I would say it's the toughness, the fact that we're a resilient group of people, and the fact that the town has done so well after the smelter and the big economic concerns that happened in the early '80s" (Interviewee 3). Anaconda continued to survive, despite the lack of economic growth and Superfund designation. For example, one interviewee commented, "I would say Anaconda is

definitely not dying. It's holding its own, and it's always trying to get new life, and I think that's the resilience of the community, too. I think that they're always pulling in that direction. They kind of refuse to die…" (Interviewee 27).

A few interviewees were more optimistic and saw Anaconda as a thriving community. One said, "The transitions occurred and there's a new generation and even a new generation's offspring are the ones that are operating today and it's business as usual" (Interviewee 20). While another went further and said, "I think we are thriving, and I think we're just going to grow. There's going to be green still, greener than it already is. We're going to keep up with our infrastructure, building homes and just bringing in the people that are good for the community" (Interviewee 3).

Discussion

The lens of collective memory helps us understand Anaconda as a community in transition, the impact of collective memory on community resilience, and provides insight for both post-industrial towns and communities facing change. For Anaconda, the stack contributed to collective memories that functioned differently throughout time. In some instances, especially right after the smelting operation shut down or when the stack was scheduled for demolition, collective memory functioned as a galvanizing force for the community to protect their history. In other instances, collective memory acted as baggage, often preventing the transition to a new future. Post-industrial communities that face transitions do not start with a clean slate (Wilson, 2012) but rather bring those collective memories to the table, which can impact decision-making, willingness to change, innovation, and engagement. Currently, in Anaconda, collective memory acts as a constraint in many areas, with many noting how the community preferred to look back to a bustling town with streetcars, bars on every corner, myriad schools and churches, and a

source of stable employment rather than ahead to a tourism and recreation destination. This fits with other research that has found that many post-industrial communities associate "better times" with the heyday of industry (Bell & York, 2010; Messer et al., 2015).

Community members' definitions of community resilience highlighted the numerous ways in which post-industrial communities may consider themselves resilient. For many, resilience equated to survival— for some that survival entailed remaining the same while for others that survival meant navigating economic, social, and ecological change. Some community members pointed to a lack of services and leadership as a sign of less resilience (Sullivan et al., 2014) while others pointed to the growing infrastructure and businesses as a sign of continuing without the company. Like Skeard's (2015) work, many community members described resilience as surviving, holding on, and simply not dying out. Other community members felt the community was stuck— a lack of entrepreneurial spirit, a resistance to economic diversification, and a preference to look toward the past rather than the future— echoing findings by Lazzeroni (2019), Matarrita-Cascante and Trejos (2013) and Sullivan et al. (2014). We contribute to previous scholarship by including the concept of collective memory, specifically, the role a physical landmark or monument plays by imposing and maintaining collective memories and impacting community resilience. Collective memory is not inherently good or bad, but rather depends on the context and timing— it can aid in recovery, rebuilding, and rediscovery and constrain thinking, displace alternate visions of the future, and divide community members.

Anaconda is nested within a larger Superfund site and process. The labeling around Superfund— stigma, contamination, risk— has implications for communities. While classification as a Superfund site is necessary to receive technical assistance, provide funding, and ensure legal obligations to clean up, it can become the dominant narrative for a community,

especially for outsiders looking in. The status of a Superfund site only offers a partial picture of Anaconda and, for some communities (especially those who have lost visual symbols on the landscape), may drown out their collective memories. Often, collective memories remain strong and passed down through generations due to these visible reminders. Shackel and Palus, 2006 (p. 50) add, "what we remember and celebrate on the landscape helps to serve and legitimize the past and the present." For entities working with communities with histories of contamination, cleanup processes must acknowledge and incorporate their collective memories, or they may lack community support or public engagement (Bailey et al., forthcoming).

We highlight the importance of dissecting and understanding the social elements, like collective memory, that facilitate community resilience. While Anaconda has a legacy of smelting contamination that extends into backyards, parks, hillsides, attics, driveways, gardens, and water sources, collective memories specifically attached to contamination or natural resources did not emerge as a tangible thread in this community. Rather, collective memories of the stack provided context that otherwise would have been missed with a singular focus on the specific environmental concerns. While the social-environmental connections are a critical area of exploration and study, different approaches may be needed to tease out those connections, or, in many cases, a focus on the elements may illuminate connections that are not strictly understood as social-environmental. We see this as an invitation to better understand the human experience through the eyes of interviewees, who may lead us down paths we did not anticipate, providing insights for research, the development of Superfund activities, local planning, and development.

Our research provides insight for entities working with Superfund and post-industrial communities. Entities should understand the potential tension that communities feel between

protecting and preserving their pasts and cleanup processes. When possible and appropriate, these entities should use collective memories to build trust and create buy-in with communities. Additionally, entities should carefully balance history and cleanup. They should exercise creativity to preserve community landmarks or areas while following legal and environmental regulations. These lessons also translate beyond the post-industrial or Superfund context, as the role of collective memory likely extends to numerous communities. Entities should take time to understand and incorporate collective memories into broader public engagement and decision-making processes. For example, these groups can address past injustices that collective memory holds on to in order to bolster community resilience. A community's hesitancy to engage with agencies or other entities may signal a strong pull toward the past and a feeling of not being heard during land management decisions or other processes. Finally, we see this as an opportunity for outreach, science communication groups, and researchers to collaborate when working in these communities. They can incorporate activities or education into their events that gather, preserve, or promote a community's stories and collective memories.

Limitations

The greatest limitation in this research was COVID-19. We conducted our interviews in the summer of 2020 when information and circumstances were uncertain and rapidly changing. This resulted in us contacting and speaking with community leaders from afar, rather than in person. While Zoom and phone interviews provided robust data, we know that there is no substitute for in-person connection and engagement. Additionally, we only spoke to community leaders— their power and status could influence their collective memory and desires for the community. We do see our interviewees as diverse in that some had formal positions of authority, as city-county officials, heads of nonprofits, or government officials, while others were

seen as informal community leaders, those with expansive knowledge of the community history or trusted perspectives. We did not ask explicitly about collective memory during our interviews. Rather, this topic and connection to the stack emerged as community leaders talked about their town, in the past, present, and future. It is possible that additional and conflicting collective memories exist but were not discussed. Our scale of focus for resilience and collective memory was the community. However, further research could examine the interactions between community-level collective memories and collective memories at other scales, both spatially and temporally. Additionally, further research is needed to examine how to harness collective memories and identify how or why they hold communities back or inspire change.

Future Directions

Further research, such as community-wide data collection, would prove useful in identifying Anaconda's collective memories. This would provide a different method of understanding collective memory and community resilience together while addressing some of the previously mentioned limitations. The Perceived Community Resilience Scale (Kulig et al., 2013) exists but has not been tested with collective memory, nor are there measures that have been tested for collective memory. As communities transition, the question of their future visions and trajectories must also be incorporated into questions of memory and resilience. We see great potential in linking these three concepts, especially in investigating how collective memories may impact the future a community envisions for itself. We encourage scholars to pursue these fruitful research directions.

Conclusion

Our case study of Anaconda, Montana explored the collective memories of the community and the critical piece collective memory plays in community resilience. By understanding a community's collective memories— which can aid in recovery and rebuilding or constrain thinking— we can increase the utility of community resilience scholarship. We found that the community had various collective memories, but that the stack perpetuated the strongest collective memories. The stack served as an anchor to the past for Anaconda, where people held out hope or wished for the better days of the past. The stack contributed to collective memories which often constrained the community's resilience. While some in the community saw themselves navigating change or prepared for a transition to a recreation economy, many thought the stack inhibited change and adaptation. Our work in Anaconda will be useful for post-industrial towns straddling transitions and other communities wrestling with their identities and histories in the present around decision-making or management.

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Chapter 3: When the Past, Present, and Future Collide: A Quantitative Approach to Collective Memory and Futuring

Abstract

To navigate social, economic, and environmental changes, communities need to develop plans for the present and actions for the future. We connect collective memory, how a community remembers the past related to their identity, and futures, ways to imagine and think about an alternative future, to provide a better understanding of how a community's past influences its present and future. This connection contributes to community scale collective memory and emphasizes the role of the past in futuring techniques. We develop quantitative measures for collective memory and future outlook, which were deployed in a household survey in Anaconda, Montana. We hypothesize that the relationship between collective memory and futures is mediated by community resilience, or the capacities available to work together and move on from a change. We test these relationships in a structural equation model and find that community resilience mediates the relationship between memory and future outlook. Our findings illustrate that collective memories influence how a community perceives its resilience, and that resilience impacts how members think about their future. Communities should consider both the past and future in decision-making and planning efforts. Subsequent research can further refine, replicate, and test the collective memory and future outlook measures.

Introduction

Collective memory and futures approaches offer a framing to understand and assist post-industrial and rural communities through times of social, economic, and environmental change or transition. Collective memory — memories held by a community relating to their identity (Hirst & Merck, 2022)— and futures approaches— ways to imagine and envision preferred and

plausible futures (Hichert et al., 2021)— temporally overlap in the present. Future scenarios, visions, and forecasts are not created from a blank slate, but rather influenced and impacted by the past and collective memory (Moore & Milkoreit, 2020; Wilson, 2015). In recent years, collective memory and futures studies have each begun to acknowledge the potential influence and importance of the other (i.e., collective memory may influence not just the present, but the future, and futures research should emphasize the future less and the past more) (de Saint Laurent, 2018; Feola et al., 2023; Oomen et al., 2021; Szpunar & Szpunar, 2016). However, the connection between collective memory and futures has not been made explicit across disciplinary divides suggesting a complex relationship that warrants further exploration. It is unlikely that a community's collective memories directly influence how they imagine or envision their future. Rather, perceived community resilience, or the resources a community thinks it has to assist in navigating change in the present and future (Berkes & Ross, 2013; Kulig et al., 2008, 2013; Magis, 2010; Norris et al., 2008), plays a mediating role in the relationship between a community's collective memory and futures.

The purpose of this paper is two-fold: 1) to link collective memory and futures through the mediating variable of community resilience and 2) to establish quantitative measures of collective memory and future outlook that can be used across communities and contexts. The paper's roadmap is as follows: first, we will explore how collective memory, futures, and community resilience are understood and measured. Next, we articulate our research questions and hypothesis. We then introduce our study location followed by our survey methods and results. The discussion offers insight into our findings, limitations, and future research directions.

Literature Review

Collective Memory: An Overview

Collective memory offers a lens into a community's past. Though collective memory crosses disciplinary divides and ranges politics, migration, and natural resources (Ariely, 2019; Jansen, 2007; Rawluk & Curtis, 2017; Van Assche et al., 2021), it is rooted in two distinct orientations — collective memory in society and collective memory in individuals (Olick & Robbins, 1998). The fields of history, sociology, geography, and anthropology maintain that collective memory exists in sites, memorials, and symbols preserved by society (Hirst et al., 2018; Olick, 1999; Olick & Robbins, 1998). In contrast, psychology defines collective memory as the memories shared by individuals in a group or community that influence their identities (Hirst et al., 2018; Hirst & Manier, 2008; Roediger & Abel, 2015). We employ an integrated definition, referring to how individuals, as parts of groups or communities, remember/forget, (re)shape, transmit, and share knowledge, experiences, and information through traditions, public symbols, conversations, oral history, texts, or networks, where collective memory requires both a historical context and connection to identity (Assmann, 2008; Foote, 1990; Foote & Azaryahu, 2007; French, 1995; Hirst & Manier, 2008; Wertsch & Roediger, 2008; Wheeler, 2014; Wilson, 2012). Collective memory "refers to the active past inextricably bound to the present identity of a group" (Brescó de Luna, 2017, p. 281).

Scholars have used diverse methods and tools to examine and analyze collective memory including oral history, content/document analysis, discourse analysis, surveys, experiments, ethnographic approaches, interviews, and participant observation (Ariely, 2019; Carlson & Berkowitz, 2012; Coman et al., 2016; Gavriely-Nuri, 2014; Hirst & Manier, 2008; Muller et al., 2016; Roediger et al., 2019; Silver, 2016; Taussig, 2017; Wheeler, 2014; Wråkberg, 2019;

Zaromb et al., 2014). Some scholars have argued for expanded methodologies to study collective memory that reach the broader population in question rather than solely analyzing texts or public symbols (Bourdon & Kligler-Vilenchik, 2011; Kligler-Vilenchik et al., 2014; Schwartz & Schuman, 2000). Most surveys have examined collective memory at the national scale where respondents name or recall important events or historical figures in their country using multiple choice or open-ended questions (Larson & Lizardo, 2007; Roediger et al., 2019; Schuman & Corning, 2000; Schuman & Scott, 1989). Surveys have identified salient collective memories but have not provided replicable measures nor have they examined the local or community scale, which could facilitate comparison across post-industrial rural communities. Some research has used demographics such as occupation, age, cultural identity, or education as explanatory variables to predict collective memory or a collective memory proxy (Corning & Schuman, 2015; Feldman-Savelsberg et al., 2005; Rimé et al., 2015).

Envisioning a New Future

Futures research creatively explores and reconceptualizes the future or alternative futures (Bengston et al., 2012; Pereira et al., 2018). The field aims to develop foresight into how and why the future may differ from the present by evaluating current dynamics and assumptions (Bengston, 2019; Wyborn et al., 2021). Futuring approaches have been used in communities to utilize stakeholders' perspectives and knowledge for policy design (Sisto et al., 2018), seek diverse expert insight to plan for rural development (Rastghalam et al., 2017), generate community interest and connect local governments and citizens in decision-making (Osborne et al., 2021), and use participatory scenario planning to discuss futures for communities in mountain geographies (Thorn et al., 2020). Because post-industrial rural communities cannot continue on their previous trajectory due to the loss of industry, environmental contamination,

economic downturn, or resource depletion, how they envision their future becomes imperative—requiring a shift from "what is" to "what could be" (Hoffman et al., 2021). Futuring involves actively imagining the future and forms a space for action (Hoffman et al., 2021). The goal is not to predict the future but outline a range of possible, plausible, and preferable futures (Bengston et al., 2012) for a community and use this insight to better plan, make decisions, and inform action (Bengston, 2019; Dator, 2009; Hoffman et al., 2021). As components of futures, perceptions of hope and outlook toward a new future can help motivate and inspire future visions and directions (Bishop & Hines, 2012; Hicks, 2001; Muñoz, 2009). In addition, hope and outlook have yet to be measured quantitatively and are understudied within the futures literature (Schultz, 2012).

Futures research has employed quantitative and qualitative methods such as visioning, scenario planning, and the Delphi method (Gordon & Glenn, 2009; Hichert et al., 2021; Popper, 2008). Scenario planning centers on a specific issue and a group develops narratives which encompass a wide range of potential futures (Bengston, 2019; Hichert et al., 2021). Bezold (2000, p. 167) describes visioning as "a compelling, inspiring statement of the preferred future that the authors and those who subscribe to the vision want to create." The Delphi method involves a panel of experts who provide their input and generate knowledge on a topic through multiple rounds (Hichert et al., 2021). These methods can be used to inform decision-making, identify tensions and similarities between stakeholders, and gain consensus from experts on emerging issues (Carpenter et al., 2005; Plummer & Armitage, 2007; Sandström et al., 2016).

A Role for Resilience

Community resilience constitutes a community's ability to work together and harness resources to thrive after an economic, ecological, or political change (Berkes & Ross, 2013; Kulig et al., 2013; Magis, 2010). Community resilience is often understood normatively, where

resilient communities are more prepared and better able to adapt to changes or disruptions (Ludin et al., 2019; Mulligan et al., 2016). A community's perceived resilience can illuminate past challenges with change, current strengths, and their preparedness for the future (Kulig et al., 2013). In the present, if a community perceives that their leadership or community cohesion is strong and supportive, that perception does not exist in a vacuum but is influenced by past experiences (Buikstra et al., 2010; Wilson, 2012). Additionally, the perception of leadership or community cohesion may affect what they consider probable or possible in the community's future. The assessment of a community's resilience also includes future considerations as capacities that enable resilience (e.g., social networks, trust, knowledge) are identified and strategies are implemented to maintain or build them (Buikstra et al., 2010; Scott, 2014).

Community resilience has been assessed using a myriad of models, scorecards, indices, and toolkits such as the ResilUS (Miles & Chang, 2011), Communities Advancing Resilience Toolkit (Pfefferbaum et al., 2016), and Community and Regional Resilience Initiative (Cutter et al., 2008) (see Sharifi, 2016 for full review). Community resilience measures have been critiqued for using the antecedents and consequences of resilience tautologically (Kulig et al., 2013; Lindberg & Swearingen, 2020; Peters, 2019). Most assessments and measurements of resilience occur after a disaster or change, which only provides a snapshot of the community. Often, community response and resources before a change are not assessed, which limits comparison or assessment of resilience in communities that have no such experiences (Kulig et al., 2013; Peters, 2019). Moreover, these tools may focus more on the past and evaluate a community based on how they have navigated past changes or disturbances (Sharifi, 2016). Some tools have incorporated future thinking such as forecasting to consider the future temporal scale (Gawler & Tiwari, 2014; UNISDR, 2014). The Index of Perceived Community Resiliency (IPCR) aims to

overcome the lack of objectivity in measurement by assessing perceived resilience. The IPCR fits within Norris et al.'s (2008) community competence sphere as a set of networked adaptive capacities and incorporates three constructs— leadership and empowerment, community engagement, and non-adverse geography (Kulig et al., 2013).

Collective Memory and Futures: Temporal Overlaps

Collective memory and futures overlap in a temporally significant way. Collective memories stem from the past and act as both "a mirror and a lamp, a reflector of and guide for the present" and the future (Schwartz, 2010, p. 627). At the same time, the future is already in "the here and now" (Hoffman et al., 2021, p. 578). Through monuments or symbols, collective memory is embodied or perpetuated as an anchor to the past and a means to understand the present and future (Brescó de Luna, 2017). Collective memory can be seen as something from the past, which occurs in the present, and constrains the future (Brescó de Luna, 2017), but how that plays out in communities, especially those going through transitions, remains unclear. Community resilience, as a dynamic process (Norris et al., 2008; Peters, 2019) functions as a mediator that connects communities' pasts with their futures by dictating what is perceived as possible from one moment to the next. In this way, resilience can be understood relative to both the past and future, where each snapshot of resilience is connected to what preceded and succeeded it (Sharifi, 2016). After a change or shock, communities often develop and plan based on one future trajectory, looking to strike a balance between what is desirable and feasible, though multiple trajectories may be possible (Robinson & Carson, 2015). Communities examine their past states to understand their future, through the evaluation of collective interactions (e.g., community togetherness, problem solving), sense of community, and the ability for the community to take action (Látková & Vogt, 2012; Phillips & Dickie, 2014; Wheeler, 2017).

However, plans or decisions can be constrained by historical factors that limit potential and achievable future pathways (Boschma, 2015; Wilson, 2015; Wyborn et al., 2015).

A gap remains in connecting collective memory and futures. Wertsch and Roediger (2022) called for a connection between collective memory and future thinking as an important new direction for collective memory research. We value the richness and depth produced by qualitative research and do not look to replace or discount it, but rather expand the available toolbox. In this paper, we use community resilience as a mediator between collective memory and futures. Limited research has explicitly connected collective memory and futures research and even less has included community resilience to connect these two concepts. We build on previous research to demonstrate that community resilience can be a mediating variable, not just an antecedent or response to a shock or disruption (Rela et al. 2020; Lee et al. 2017). We also contribute to futures research with a focus on post-industrial rural communities in the United States, which outside of climate change, lack attention in major futures journals (e.g., Futures, Journal of Futures Studies, World Futures Review).

We replicate Kulig et al. (2013's) Index of Perceived Community Resilience to investigate its potential to mediate the relationship between collective memory and futures. We build on work by Feola et al. (2023), who argue that the future is overemphasized in transition and futures research. Communities design and develop plans in the present but often negate the role of the past, specifically which collective memories are reconstructed or appear in the present that then steer their future. Much of the collective memory research in psychology focuses on a national or global scale and we contribute a finer grain of examination at the community scale. We ask: 1) can we develop quantitative and replicable measures of collective memory and futures; 2) is there is a statistically significant relationship between collective memory and

futures; and 3) does community resilience mediate the relationship between these variables? We hypothesize that a community's futures are driven by their collective memory and perceived community resilience. We predict that collective memory will have a significant positive effect on community resilience and community resilience will have significant positive effect on futures (Figure 3.0).

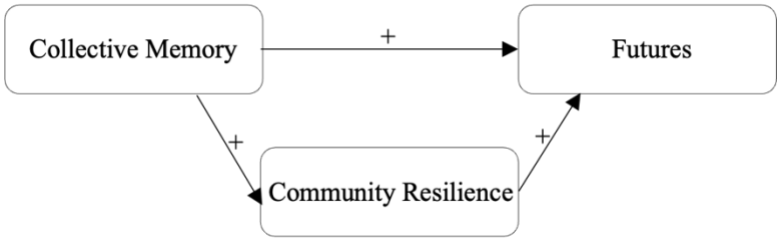

Figure 3.0. Conceptual Model

Study Area

Our study occurs in the town of Anaconda in southwestern Montana. In the early 1880s, Anaconda was established to process and smelt copper ore. From 1883-1980 it was one of the main copper smelting operations in the United States and boasted the largest smokestack in the country at 585 feet (Morin, 2009). The smoke from the stack produced widespread contamination from heavy metals and deposited on the surface water, groundwater, and soils across the town and surrounding valley (Bryson, 2013; MacMillan, 1999). The smelting operation also produced large amounts of waste— flue dust, tailings, slag— that was not properly disposed of and contaminated soils and water (EPA, 1994, 1998, 2011). Until 1977, the Anaconda Company owned and operated the smelter operation and provided the primary employment in Anaconda. After buying the company, Atlantic Richfield closed the smelting operation in 1980. That same year, the U.S. Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) establishing the Superfund program to

address contaminated areas in the United States (GAO, 2019). Under CERCLA, the potentially responsible party, usually the owner (or previous owner) of a site pays for the cleanup and works with the Environmental Protection Agency (EPA) and state agencies (GAO, 2019). In 1983, the EPA designated a 300-square-mile area adjacent to the town as the Anaconda Co. Smelter Superfund site. In the early years of the cleanup, the smelter operation was demolished. However, a group of citizens fought to preserve the stack and secured it on the landscape when it was placed on the National Register of Historic Places in 1987 (Bryson, 2006). While the bulk of the cleanup work has concluded, ongoing remediation and construction projects will continue until 2027 (Hooks, 2023).

In recent years, the consolidated city-county government of Anaconda-Deer Lodge County and Atlantic Richfield, the potentially responsible party, have finalized a series of agreements to finish the cleanup and provide Anaconda with resources. In 2020, a settlement agreement allocated $28 million for economic development and increased human health and safety measures related to contamination (e.g., blood lead testing for residents and domestic well testing) (McCumber, 2020). This sum also included $3 million toward a new hotel in town and $1 million each year for 25 years for economic development (Cast, 2021; McCumber, 2020). At the end of 2022, the EPA, U.S. Department of Justice (DOJ), Montana Department of Environmental Quality, and Atlantic Richfield reached an agreement that will govern the remainder of the site cleanup and maintenance (Hooks, 2023). Atlantic Richfield will pay $83 million for future cleanup work (Eggert, 2022; Hooks, 2023). In the past decade, Anaconda has positioned itself as a tourism and recreation destination and prioritized development. New residents have moved to town, businesses have opened or relocated, and housing demand has increased drastically (Adams, 2023; Thorton, 2021).

Methods

Sampling

This survey was conducted as part of the Consortium for Research on Environmental Water Systems (CREWS) NSF EPSCoR project. We used an address-based stratified random sample purchased from Dynanta, Inc. The study population included adults over 18 who lived in Anaconda. Our study only refers to adults living in an occupied dwelling and does not include those incarcerated or without housing. Addresses were randomly selected from three census tracts in Anaconda. Within a household, respondents were randomly selected based on the next birthday method (Dillman et al., 2014). In 2020, the population of adults over 18 living in Anaconda was 7,887. The response rate was calculated using the American Association for Public Opinion Research response rate formula 3 (AAPOR, 2016):

$$I/((I+P) + (R+NC+O) + e(UH+UO))$$

I = Complete Interviews

P = Partial Interviews

R = Refusal and break off

NC = Non-contact

O = Other

UH = Unknown Household

UO = Unknown Other

e = the estimated proportion of cases of unknown eligibility that are eligible (e = 0.622 in this survey).

Survey Development and Dissemination

We disseminated the survey in February-April 2022 following a Dillman Tailored Design Method (Dillman et al., 2014). Research questions and survey measures were approved by the University of Montana Institutional Review Board (#127-121). We piloted the questionnaire to five community members, six graduate students, and three professors on the CREWS project. The questionnaire was self-administered, and potential respondents received four requests for participation. First, all potential respondents received a pre-survey letter that explained the project and invited them to participate via a link to the internet questionnaire in Qualtrics or wait for a paper questionnaire coming in the following weeks. Second, nonrespondents received a second letter that included a link to the internet questionnaire, a paper questionnaire, and a pre-stamped return envelope. Third, nonrespondents received a third letter that included a link to the internet questionnaire, a paper questionnaire, and a pre-stamped return envelope. Fourth, nonrespondents received a fourth letter that included a link to the internet questionnaire, a paper questionnaire, and a pre-stamped return envelope. The Bureau of Business and Economic Research (BBER) at the University of Montana collected and kept track of returned mail, completed and spot-checked data entry for errors, labeled the data (e.g., composite variables and flags for analysis), and calculated survey weights. BBER utilized IBM SPSS Statistics Version 28 (2021), SAS Version 9.4 (2021), and Statistics Canada's G-EST Version 2.03 (2019) to process data (Baldridge, 2022a).

BBER calculated the survey weights using a three-step process (Battaglia et al., 2016; Haziza & Beaumont, 2017; Lavallee & Beaumont, 2016; Valliant et al., 2013). First, BBER calculated the base weight which computes the probability of each respondent in the sample being selected. The American Community Survey 5-year estimate from the U.S. Census Bureau

provided the population control for adults 18 years and older. Second, BBER modified the base weight to include nonresponse (Battaglia et al., 2016; Brick, 2013; Haziza & Lesage, 2016; Kreuter & Olson, 2013; Olson, 2013). Third, BBER calibrated the nonresponse-adjusted weight to the population control totals using the sampling strata, age, sex, household size, and educational attainment (Haziza & Beaumont, 2017; Lavallee & Beaumont, 2016; Valliant et al., 2013). BBER provided a population weight in the dataset to estimate the number of adults in the study population with a specific characteristic (Baldridge, 2022a).

Nonresponse Bias

We also examined the data for evidence of nonresponse bias, a type of survey error where those who did not respond to the survey are different from those who did respond in a way that affects the study (Dillman et al., 2014). We used three different methods to evaluate potential nonresponse bias. We examined the quality of the response rate (36.8%) with other rigorous mixed-mode, self-administered surveys in the AAPOR Report of the Task Force on Transitions Telephone Surveys to Self-Administered and Mixed-Mode Surveys (AAPOR Task Force, 2019). In this report, 21 response rates from mail-internet surveys ranged from 18-50% (AAPOR Task Force, 2019). Based on this range, we concluded that our survey had a quality response rate. However, response rates alone do not determine nonresponse bias (Curtin et al., 2000; Keeter et al., 2000) so we conducted two additional examinations at the variable level of interest. Second, we looked at the mean differences using the survey weights, where we compared survey questions weighted to account for survey design with survey questions weighted to account for survey design and potential nonresponse bias (Lohr et al., 2016). We compared the means: μDWT - μFNLWT, where μDWT is the mean response to a survey question using data weighted for the survey design and μFNLWT is the mean response to a survey question using data

weighted for the survey design and potential nonresponse bias (see Appendix B for full nonresponse bias results). We chose 33 survey questions, calculated the means, and performed t-tests. We did not find evidence of mean differences at the 0.05 level for the design weighted and nonresponse weight means. While this technique provided further confirmation of a lack of nonresponse bias, it only highlights potential effects inferred from nonresponse (Baldridge, 2022b).

To directly investigate the presence of nonresponse bias, we utilized response propensity. We examined the covariance between response propensity and survey questions to assess nonresponse bias (Groves et al., 2009). We used a logistic regression model from the survey weight construction to estimate each individual's (in the sample) propensity to respond. We estimated the relationship between the survey questions and response propensity using the generalized linear model: $Y_n = \alpha_0 + \beta_1 X_{1n} + \beta_2 X_{2n} + \varepsilon_n$.

Y = Response to survey question (dependent variable)

n = Individual respondent

α_0 = Intercept

β_1 = Survey parameter estimate

β_2 = Response propensity parameter estimate

X_1 = Survey

X_2 = Response propensity

-1 = Low (respondent is in the lowest 2 quintiles of response propensity for the entire survey sample)

1 = High (respondent is in the highest 2 quintiles of response propensity for the entire survey sample)

εn = Error term

For 32 of 33 questions, the relationship between the survey question (variable of interest) and response propensity was not significant at the 0.05 level, indicating no evidence of nonresponse bias. Question 20_9, a community resilience measure (e.g., For each of the following statements about your community, please indicate your level of agreement or disagreement: the changes in my community are positive) showed a potential relationship between answers to the question and propensity of the study population to respond to the survey. In this question, individuals with low response propensity were more likely to disagree than those with high response propensity. Based on the response rate, lack of mean differences at the variable level of interest, and no relationship between 32 of 33 variables of interest and propensity to respond, we determined that there was very little evidence of nonresponse bias in the survey (Baldridge, 2022b).

Survey Design

The survey was part of a broader cross-institution and interdisciplinary effort (CREWS NSF EPSCoR) to better understand how water resources fit into a community's story (see Appendix C for all survey measures). We asked questions about water resources, trust in state and federal agencies, public engagement, and satisfaction in the Superfund process. Most of the survey questions were on a 5-point Likert scale from strongly disagree to strongly agree. We developed 12 collective memory items (Table 3.0) that represented history and identity, two main components of the concept (Coman et al., 2009; Foote & Azaryahu, 2007; French, 1995; Hirst & Manier, 2008; Vaneeckhaute et al., 2017; Wheeler, 2014; Wilson, 2015; Zerubavel, 2003). We expanded on existing collective memory surveys that require respondents to recall or share memories in an open-ended format and then examine the relationship between what was

chosen and who chose it (Corning & Schuman, 2015; Feldman-Savelsberg et al., 2005; Roediger et al., 2019). We built on our findings from previous interviews with community leaders in 2020 that the Anaconda Co. Smelter Stack served as a site of collective memory in the community and centered our measures around it. While others have often utilized archival documents or document analysis to examine collective memory (Jansen, 2007; Perez-Sindin & Van Assche, 2020; Van Assche et al., 2021), our focus was the current community's collective memory and defining replicable measures.

We drew on futures and hope scholarship and interviews to craft future outlook measures (Inayatullah, 2008; Liu & Lin, 2018; Stevens et al., 2014; Tonn et al., 2006). We built on qualitative futures literature and quantitative hope measures, which are seen as important in one's future perceptions (Stevens et al., 2014). We used future outlook as a proxy for futures as means to measure and test the concept.

Table 3.0. Collective Memory, Future Outlook, and Community Resilience Measures

Survey Question	Measurement	Citations
Collective Memory		
We are interested in learning more about the smelter stack in Anaconda. Please indicate how much you agree or disagree with the following statements.	1-5 Likert Scale 1= Strongly Disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly Agree	Adapted from Lewicka (2008); Messer et al. (2015); Wheeler (2014); Williams & Vaske (2003); Wråkberg (2019)
We are proud to have the stack. It is common knowledge that the stack is important to my community. Most community members find the stack important. The community is emotionally attached to the stack. Protecting the stack is key to promoting our community identity moving forward. The stack keeps the community from moving on.		
Collective Memory		

We would also like to know more about the community identity of Anaconda. Please indicate how much you agree or disagree with the following statements.	1-5 Likert Scale 1= Strongly Disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly Agree	Adapted from Bell & York (2010); Keane (2000); Kyle et al. (2003); Lewin (2019); Skeard (2015)
I feel connected to the mining and smelting heritage of Anaconda. It is important to remain connected to the mining and smelting heritage of the past. The lifestyle during the smelting era shaped the current character of Anaconda. The stack is part of my identity.		
Future Outlook		
For each of the following statements about your community's future, please indicate your level of agreement or disagreement.	1-5 Likert Scale 1= Strongly Disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly Agree	
This community gives me plenty of resources in planning for the future. I do not feel limited by the options that are available here. Overall, this community is headed in the right direction. I feel hopeful about my community's prospects for the future.		Adapted from Inayatullah (2008); Liu & Lin (2018); Tonn et al. (2006); Stevens et al. (2014)
Community Resilience		
Next, we would like to know about your feelings about your community in general. By "community," we are referring to the city or town where you live or live near. For each of the following statements about your community's future, please indicate your level of agreement or disagreement.	1-5 Likert Scale 1= Strongly Disagree 2= Disagree 3= Neither agree nor disagree 4= Agree 5= Strongly Agree	

The physical environment in my community negatively affects my health. People in my community help one another. Residents in my community feel isolated from other parts of the state. The people in my community are open to new ideas. People who live in my community have similar values or ideas. There is a sense of pride among people in my community. Leaders in my community listen to residents. My community has strong community leadership. The changes in my community are positive. When a problem occurs, community members are able to deal with it. Residents of my community participate in community events.	Replicated from Kulig et al. (2013)

Analysis

We ran descriptive statistics, identified missing data, conducted an exploratory factor analysis in IBM SPSS (Version 29), and then ran our structural equation model in R (lavaan package). We used listwise deletion to remove cases where over half of the questions remained unanswered and imputed the sample mean for cases missing a few items. We conducted an exploratory factor analysis with varimax rotation to identify distinct dimensions of collective memory, future outlook, and community resilience. We ran a reliability analysis to determine that the items measured the composite variables (Cronbach alpha > .70) (Cronbach, 1951; Taber, 2018).

We used structural equation modeling to evaluate our conceptual model of collective memory, future outlook, and community resilience. Structural equation modeling (SEM) enabled us to simultaneously estimate relationships with multiple independent or dependent variables (Kline, 2015). SEM allowed for testing hypotheses about these relationships by identifying a model that represented our predictions (Kline, 2015). Following best practices, we utilized four

fit statistics as there is no universal best fit statistic (Kline, 2015). These fit indices allowed us to evaluate how well the data represented the hypothesized model. We assessed the model fit using the Root Mean Square Error of Approximation (RMSEA) < .07, Comparative Fit Index (CFI) > .95, Standardized Root Mean Square Residual (SRMR) < .08, and Tucker-Lewis Index (TLI) > .95 (Bentler, 1990; Bentler & Bonett, 1980; Hu & Bentler, 1999).

Results

Respondent Characteristics

We sent 1,539 surveys to Anaconda resulting in 347 respondents and a response rate of 36.8%. On average, respondents had lived in Anaconda for 38 years. For many, they or their parents were born in Anaconda. The mean age of respondents was 64 years old (n = 330). Respondents had varied educational experiences (Table 3.1). They did not work in specific sectors but groups that stood out included those who were retired, worked in healthcare, the service sector, or trades. In a historically democratic union town, respondents were split between conservative, moderate, and liberal, though 20% chose not to answer their orientation. Most respondents reported that they were able to cover their monthly expenses.

Table 3.1. Respondent Characteristics

Respondent Characteristics	
Mean Age	64 years
Gender	
Male	51%
Female	49%
Education	
High School	48%
College, no degree	16%
2-year college degree	14%
4-year college degree	9%
Graduate or professional degree	7%
Occupation	
Retired	41%
Healthcare	8%
Service (banking, customer service, insurance)	17%
Education	6%
Trades (carpentry, electric)	7%
Political Orientation	
Very conservative	13%
Somewhat conservative	14%
Moderate	29%
Somewhat liberal	14%
Very liberal	8%
Financial Situation	
Household struggles to cover monthly expenses	26%
Household has enough to cover monthly expenses	54%
Household has more than enough to cover monthly expenses	21%

Collective Memory, Future Outlook, and Community Resilience

For the open-ended collective memory questions, 228 people (of 347) responded. Of that group, 70% of respondents (n = 160) reported the smelter closing as one of the three most

important events in the history of their community in the past 100 years. Overwhelmingly, respondents reported Washoe Park (n = 210) and Kennedy Commons (n = 70) as the most important places, buildings, and parks in their community. Only twelve respondents listed the stack or the Stack State Park as the most important place in their community.

Respondents agreed that the stack was related to their identity and history. They felt most strongly that *it is important to remain connected to the mining and smelting heritage of the past* (M = 3.93). They agreed less that the *stack is part of my identity* (M = 3.17). Respondents reported higher mean values for individual history 1 items compared to the identity items (Table 3.2). Compared to the stack being part of their individual identity, respondents felt strongly that the *stack is part of the community's identity* (M = 4.34). There was also agreement, though slightly less strong, that *the lifestyle during the smelter era shaped the current character of Anaconda* (M = 4.00). Respondents indicated the lowest mean values for history 2, *the stack keeps the community from moving on* (M = 2.69) and *community members disagree about the meaning of the stack* (M = 3.07).

In the future outlook items, respondents reported higher means values for the direction of the community and community prospects and lower mean values for the resources and options in the community. For example, respondents felt slightly more *hopeful about my community's prospects for the future* (M = 3.89) than *this community gives me plenty of resources in planning for the future* (M = 3.36). Respondents thought *this community is headed in the right direction* (M = 3.74) more than *I do not feel limited by the options that are available here* (M = 3.36).

For the community resilience items, respondents reported lower mean values for community resilience related to leadership and empowerment, such as *leaders in my community listen to residents* (M = 3.21) compared to resilience items about community engagement like

people in my community help out one another (M = 4.21). Respondents thought that *when a problem occurs, community members are able to deal with it* (M = 3.66) though they felt more strongly that *residents in my community participate in community events* (M = 4.08).

Exploratory Factor Analysis

We found two history dimensions (α = .89 and α = .47) and one identity dimension (α = .87) that made up collective memory, one future outlook dimension (α = .95), and two community resilience dimensions (α = .97 and α = .93) (Table 3.2). We recognize that the history 2 dimension has a low Cronbach's alpha. We chose to keep the construct in the model to remain consistent with the theoretical approach to collective memory. Two community resilience items did not factor (the physical environment in my community negatively affects my health; residents in my community feel isolated from other parts of the state). Variance (VIF) inflation values examined in IBM SPSS did not indicate multicollinearity issues. We conducted a preliminary path analysis in IBM SPSS to explore relationships prior to running our structural equation model in R.

Table 3.2. Item Means, Standard Deviations, Factor Loadings, and Cronbach α for Composite Variables.

Composite Variables and nested items[a]	Mean	SD	Factor loading[b]	Cronbach α
Collective Memory: Identity	3.65	.95		.87
Protecting the stack is key to our community identity moving forward	3.96	1.29	.874	
I feel connected to the mining and smelting heritage of Anaconda	3.64	1.26	.826	
It is important to remain connected to the mining and smelting heritage of the past	3.93	1.31	.783	
The stack is part of my identity	3.17	1.50	.919	
Collective Memory: History 1	4.02	.76		.89
We are proud to have the stack	4.07	1.30	.724	
It is common knowledge that the stack is important to my community	4.13	1.20	.780	
The stack is part of the community's identity	4.34	1.02	.802	
Most community members find the stack important	4.25	1.33	.544	
The community is emotionally attached to the stack	4.03	1.21	.630	
The lifestyle during the smelter era shaped the current character of Anaconda	4.00	1.12	.575	
Collective Memory: History 2	2.67	.89		.47
Community members disagree about the meaning of the stack	3.07	1.55	.654	
The stack keeps the community from moving on	2.69	1.50	.654	
Future Outlook	3.20	.716		.95
This community gives me plenty of resources in planning for the future	3.36	1.70	.902	
I do not feel limited by the options that are available here	3.36	1.85	.776	
Overall, this community is headed in the right direction	3.74	1.61	.931	
I feel hopeful about my community's prospects for the future	3.89	1.59	.916	
Community Resilience 1: Leadership/Empowerment	3.21	.77		.97

Leaders in my community listen to residents	3.51	1.79	.862	
My community has strong community leadership	3.46	1.71	.936	
The changes in my community are positive	3.75	1.62	.911	
When a problem occurs, community members are able to deal with it	3.66	1.63	.915	
Community Resilience 2: Community Engagement	3.55	.509		.93
People in my community help out one another	4.21	1.42	.729	
The people in my community are open to new ideas	3.48	1.83	.741	
People who live in my community have similar values or ideas	3.72	1.77	.755	
There is a sense of pride among people in my community	4.17	1.46	.861	
Residents of my community participate in community events	4.08	1.47	.845	

[a]Question wording: "For each of the following statements, please indicate your level of agreement or disagreement." Respondents were asked to indicate the extent to which they agreed or disagreed using a five-point Likert scale where 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree.

[b]Factor loadings on Collective Memory, Community Resilience, and Future Outlook extracted using principal component analysis with Varimax rotation and Kaiser normalization.

Structural Equation Model

The structural equation model indicated adequate fit for the data (CFI = 1; SRMR = .006; RMSEA = .000; TLI = 1.02). We found that history 1 and identity positively predict community resilience 1 (R^2 = .10). History 1, identity, and history 2 also positively predict community resilience 2 (R^2 = .25), though history 2 has less effect than the other two dimensions (Figure 3.1 and Table 3.3). Community resilience 1 and 2 positively predict future outlook (R^2 = .40) with less evidence that identity or history 1 have effects. Overall, future outlook was mediated by community resilience.

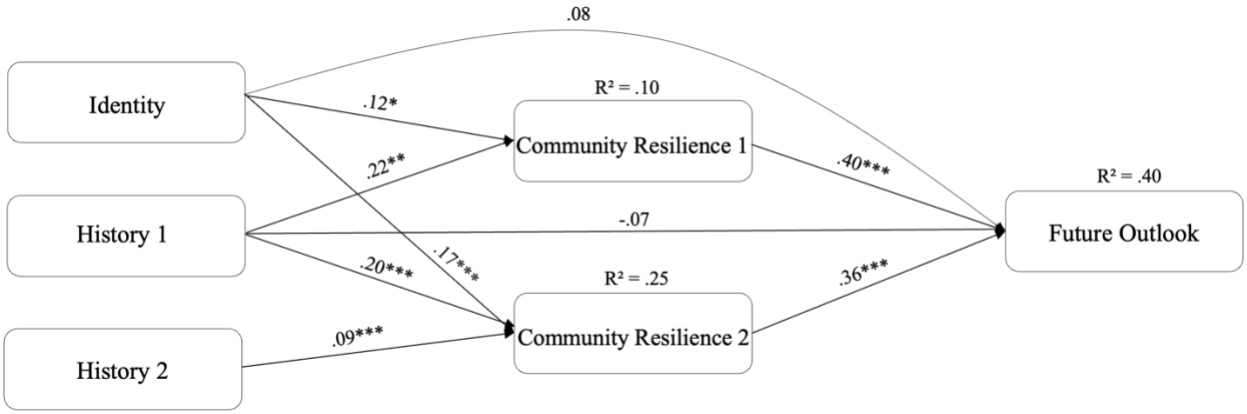

Figure 3.1. Final Model. *$P \leq .05$, **$P \leq .01$, ***$P \leq .001$

Table 3.3. Structural Equation Model Analysis

Path		β	SE	z-value	R^2
Identity	→ Community Resilience 1	.12*	.059	1.96	.10
History 1		.22**	.075	2.92	
Identity	→ Community Resilience 2	.17***	.039	4.33	.25
History 1		.20***	.048	4.13	
History 2		.09***	.027	3.34	
Identity	→ Future Outlook	.08	.047	1.64	.40
History 1		-.07	.060	-1.24	
Community Resilience 1		.40***	.048	8.48	
Community Resilience 2		.36***	.075	4.87	

Discussion

Collective memory and futures are linked by a community's perception of its resilience. Indeed, collective memories of past events influence how people perceive their resilience to change, what options they believe are available to them, and how they navigate the future. We illustrate these relationships through a novel and replicable approach, while introducing a quantitative method for measuring collective memory. This work contributes to a nascent understanding of how memory and perceived resilience dictate pathways for imagining and

realizing the future, a particularly important endeavor for post-industrial rural communities navigating economic or environmental change.

Respondents saw the stack as an important part of their identity and history— confirming that the stack is part of collective memory. While community resilience has been separately used as a dependent and independent variable in previous research (Li et al., 2016; Peters, 2019; Verbena et al., 2021), we demonstrated that community resilience mediates the relationship between collective memory and future outlook. People have strong pride in the stack's history, which was one of the strongest predictors of community resilience, indicating that pride rooted in a historical context contributes to perceptions of community resilience. People with strong pride, and strong collective memory, are more likely to think the changes in their community are positive and people in their community are open to new ideas. Some scholars have addressed this connection, where strong cultural heritage can motivate action to preserve it, building resilience through action (Beel et al., 2017; Stevens et al., 2010).

Though slightly less strong than history, identity acted as an important predictor of community resilience. Those that feel connected to the smelting heritage and want to protect the stack as part of their community's identity are more likely to perceive their community as resilient, where people in their community share similar values and participate in community events. Previous research has found that identity, as part of collective memory, plays a role in participation and social action and how a community responds to challenges (Messer et al., 2015; Shriver & Kennedy, 2005; Wulfhorst, 2000).

The community resilience measures were strong, positive predictors of future outlook. Communities that perceive themselves to be resilient are more likely to feel hopeful about the future and expect that they will remain resilient to future changes (Ahmed et al., 2004; Ganor &

Ben-Levy, 2003). When leadership, empowerment, and community engagement are present, people will also feel that there are options for their future. Future outlook differs from community resilience since it is forward-facing, while perceived community resilience captures the present moment. Measuring community resilience measures as a snapshot in time fails to capture the inherent dynamism of the concept (Kulig et al., 2013; Peters, 2019), but a connection with future outlook offers a way to better operationalize these measures.

We complement existing collective memory scholarship by providing a community-scale study. In interviews with community leaders (Moore et al., forthcoming), the stack emerged as a landmark that perpetuated particular collective memories and impacted community resilience. In our work, we found that collective memory does have a direct, but more complicated, relationship with community resilience. The history 2 dimension proved less important and influential in the model than the other facets of collective memory. Interestingly, this dimension comprised sentiments that disagree about the meaning of the stack and the stack keeping the community from moving on. As a community that considered itself to be resilient, it is possible that members did not think their community was held back by that part of history— choosing the dominant narrative of the stack as a connection to better times and prosperity (and what it means for them and says about their community) rather than other conflicting narratives that might exist (Conway, 2010). Often, collective memory scholars utilize a "presentist" lens, examining how the past and memory are constructed or reconstructed in the present (Jansen, 2007; Szpunar & Szpunar, 2016). While recent memory research in psychology has started to connect memory with future thinking, this line of inquiry focuses on cognitive and neural mechanisms within individuals rather than community-scale memories (Hirst & Merck, 2022; Szpunar & Szpunar, 2016). Through community resilience, collective memory plays a role not just in the present but

into the future, where the past influences how individuals think and make decisions in the present and for their future.

This work also confirmed previous qualitative research in the community that found community members perceived themselves to be resilient, where they believed there was strong engagement and leadership in their community (Bailey et al., forthcoming). It has also built on community resilience scholarship, some of which has incorporated collective memory or other types of memory qualitatively, and explicitly quantitatively connected these concepts (Madsen & O'Mullan, 2013; Rawluck & Curtis, 2017; Wilson, 2015). It also offers an opportunity for resilience assessments (e.g., CARRI, CART) to include collective memory measures when identifying community characteristics and developing a community profile. People's perceptions of their own resilience matter just as much or more than other objective metrics of resilience. A person's perceptions of their own resilience capture these objective aspects, but also integrate the complex context within which a person thinks and lives. How people perceive their reality greatly influences the options they believe are available to them and thus, how they behave. It remains unclear how a community's perceived resilience may affect their future resilience— it is possible that perceived resilience can bolster future resilience, but it may also lead to complacency to adapt to changes, or factors that enable resilience in the present are irrelevant in the future (Amundsen, 2012).

Futures research has called for more attention to the past and we provide evidence that not only is it needed, but it is connected to collective memory. Some futures research has acknowledged the role of the past or temporal relationships between the past, present, and future (Adam & Groves, 2007; Hoffman et al., 2021; Oomen et al., 2021; Priebe et al., 2021). However, most studies have examined how the future may be (or should be) different than the present,

rather than how the past exists in the present and shapes interpretations in the present—influencing how people anticipate for the future (Kojola, 2020). Collective memory is central to people's identities and emotions and can shape their future desires (Kojola, 2020; Smith & Campbell, 2017). While collective memory has been examined in post-industrial rural communities (e.g., Adams et al., 2018; Wheeler, 2014; Wråkberg, 2019), future outlook provides a connection to different temporal scales in the community. While futuring approaches have been utilized in sustainability and transformation literature, collective memory has been used less. Collective memory can be a useful framing when studying social and material transitions, which will likely be an increasing focus of study as more industrial communities adapt to new economic climates (Feola et al., 2023).

There are practical implications for post-industrial rural communities and broader contexts. For decision-making, policy, and planning processes, collective memory sheds light into the identities and histories of a community which can help determine what they value in the present and the future. For post-industrial rural communities experiencing changes, they may be developing and creating community and economic development plans that seek to embrace their cultural heritage while also proposing forward-thinking action (Scott et al., 2019). It is important for those with decision making power to include the broader community and acknowledge that development extends beyond planning and infrastructure, and includes a negotiation of physical and symbolic landscapes, many of which hold and perpetuate collective memory (Stokowski, 2016). With regards to future outlook, while the past must be incorporated, how a community perceives itself in the present will have an impact on its future. There should be efforts in place to support futuring approaches as communities experience change and transition while also providing adequate support and leadership in the present.

Our work emphasizes the importance of embarking on futuring techniques for communities. Futures research has less presence in academia but has been used for decades in military and business contexts. Futuring techniques can be used in communities, especially those who use consultants or other companies during strategic planning and development, to improve the quality of decisions and bolster economic and social potential (Bengston, 2019; Hichert et al., 2021; Osborne et al., 2021; Sisto et al., 2018). Valuable insights can emerge from the sheer number of ideas generated from futuring exercises, allowing for creativity among more participants and community members (Bengston et al., 2022; Michalko, 2006). Future outlook is just one approach in a suite of futuring techniques. After better understanding their outlook, communities can utilize other futuring techniques like backcasting. Backcasting involves working backwards from the future to the present to create a pathway of how to get there—actions to take, decisions and policies to enact, resources required, and anticipated challenges (Bengston et al., 2020). Brown et al. (2012) advocate for futuring techniques because without them, communities offer competing visions in the present that result in tension between their past and future.

There is an opportunity to better include community members in decision-making and planning processes. Some futuring techniques (e.g., scenario planning, Delphi method) only include a small group of experts or decision-makers (Bengston et al., 2020; Hichert et al., 2021). Community wide surveys and public engagement can democratize the process of communities planning for and envisioning their futures. Our survey results captured responses from more people compared to previous interviews in the community and provided additional insight into how people consider and perceive the future. This information can be used by local governments

and other entities to tailor communication, outreach, and engagement to the community about decisions and plans.

Limitations and Future Directions

For the open-ended collective memory questions, we asked respondents to provide the three most important places (e.g., parks, buildings, gathering spots) in their community. In an effort to not bias responses towards the stack, we chose not to specifically ask for landmarks or monuments. In addition, the stack is not accessible to visit and closed to the public most of the year. As a result, the stack was only listed a handful of times compared to other areas in town. However, respondents did list the closure of the smelter as one of the most important events. It is possible that the stack was underemphasized as a site of collective memory due to our phrasing, events regarding the smelter are stronger for the community than the stack itself, or the stack is an important site of collective memory despite limited physical access. Limitations exist in our structural equation model. We chose to keep the history 2 dimension as our approach was to hypothesize a model, fit it, and interpret it. In subsequent work, we will further evaluate the need for history 2 in our model as well as the potential to combine the two resilience dimensions into one dimension. We also acknowledge that our future outlook dimension, though based on futures literature, is limited and will benefit from further refinement and testing. We only examined these relationships in the community of Anaconda and efforts should be made to examine their utility in other communities and scales.

There are opportunities for future research based on our findings. We hope that the collective memory and future outlook measures are replicated and tested. Subsequent research can modify our measures to fit specific contexts and use other important landmarks or cultural references. We also hope that the role of community resilience as a mediator attracts more

attention and that collective memory measures are incorporated into resilience assessments. While the collective memory measures centered on the stack, subsequent research can explore how the measures work and relate when the collective memories in question are disputed, erased, or in conflict.

Conclusion

Our study explored the relationship between collective memory, community resilience, and futures. We developed quantitative measures for collective memory and future outlook and then tested the relationships between these concepts and community resilience in a structural equation model. We found that community resilience mediates the relationship between collective memory and future outlook. For the community of Anaconda, Montana, collective memories related to the stack, such as pride in the stack and the need to preserve it as part of the community's identity, influenced perceptions of resilience, where community members thought there was strong leadership and engagement. The community's perceived resilience strongly influenced how they thought about the future such as their hope in the community and available resources. The connection between collective memory and future outlook highlights the need for further collective memory research at the community scale to match the planning and decision-making that occurs as post-industrial rural communities face changes and transitions.

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Chapter 4: A Phenomenological Approach to Superfund Community Engagement

Abstract

Superfund sites across the United States pose contamination and pollution issues for communities and ecosystems. These sites often require years of cleanup and millions of dollars to remediate. A critical aspect of cleanup success revolves around engagement efforts with local communities, but often, these efforts fall short in meeting communities' needs. We address a gap in the Environmental Protection Agency's current community engagement approach. Drawing on phenomenological and semi-structured interviews in a post-industrial and Superfund community, we investigate the importance of lived experiences. We demonstrate that lived experiences provide insight into the complicated nature of cleanup, where industrial sites are more than contamination, encompassing meaning, narratives, and memory. Our findings underscore a need for community engagement to incorporate more informal engagement, collaboration with outside experts, and robust Community Involvement Plans.

Introduction

"*Stack Savers Unite"* — Montana Standard headline, 1983.

Superfund sites across the United States have deleterious impacts on local communities and ecosystems. Currently, there are 1,335 Superfund sites across the country, with over a quarter of the population living within three miles of a site (EPA, 2020a, 2022a). The most critical sites, listed on the National Priorities List, pose considerable risks to human health and local livelihoods through the release of contaminants, hazardous substances, or pollutants (EPA, 2022a). Since 1980, the Environmental Protection Agency (EPA) has spent over $5 billion to remediate contaminated sites which does not include the billions spent by private companies

most often tasked with paying for cleanups (EPA, 2023a). It is important that the time and financial investment— sites can take years to decades to clean up— prove successful. Cleanups are enhanced and more successful when community members are engaged (Bernhardt et al., 2005; Metcalf et al., 2015; Petts, 2008).

Cleanup success is contingent upon community engagement throughout the decision-making process (Maxwell & Kiessling, 2022). If communities are not engaged or dissatisfied with the process, it can affect cleanup progress, achievement of cleanup objectives, and larger outcomes like equity and justice (Beckett & Keeling, 2019; Lehigh et al., 2020; Maxwell & Kiessling, 2022). Environmental justice and equity outcomes extend beyond cleanups and have been named policy priorities in Executive Order 14008 (Exec. Order No. 14008, 2021). The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), which governs the Superfund program, stipulates the inclusion of local communities throughout specific stages in the cleanup (EPA, 2020b). Over the years, the EPA, which administers the program, has developed several directives and initiatives, such as community involvement handbooks and public participation policies, to better facilitate engagement (EPA, 2001, 2003, 2014, 2020b). While the intent behind these policies is forward-thinking, these policies do not emphasize cultural and historical factors. This can result in tension and a lack of understanding about the complicated industrial, cultural, and historical legacies that are present.

Recent scholarship has sought to improve community processes and offer concrete approaches for meaningful and timely engagement as well as advocating for greater attention to social, cultural, and historical dynamics during cleanup activities (Charnley & Engelbert, 2005; Cruz, 2019; Foley et al., 2017; Maxwell & Kiessling, 2021, 2022). Restoration scholarship has provided the idea of “layered landscapes” or the consideration of varied historical, cultural, and

ecological layers and meanings during restoration work, where objectives extend beyond the ecological (Coates, 2016; Hourdequin & Havlick, 2016). Differing from restoration, remediation involves the cleanup of highly contaminated sites that, in most cases, will be managed rather than fully restored and often reinforces a contamination narrative for local communities (Beckett, 2021; Beckett & Keeling, 2019; Langhorst & Bolton, 2017).

We believe that lived experiences should play a greater role in how local communities and people are engaged in the Superfund process. Lived experiences illuminate the complicated nature of Superfund cleanup, where industrial landscapes are important sites of contamination and collective memory. In addition, lived experiences illustrate social, cultural, and historical dynamics such as community connections and interactions, perceptions of quality of life, ties to current and former industries, and attachment to place (Borges & Torres, 2012; Buys et al., 2015; Caretta & McHenry, 2020; Tuan, 1977). This paper contributes to the conversation around Superfund, remediation, and community involvement by advocating for the incorporation of lived experiences in engagement efforts.

To explore the importance of lived experience for Superfund policy and objectives, we developed a study of Anaconda, Montana. After 100 years as a copper smelting giant, the community experienced a transition from a company and industrial town to a Superfund site and is now considering its future as the Superfund chapter concludes. We document the lived experiences of the community around a site of collective memory, the Anaconda Smelter Stack, once the primary source of employment and pollution that now exists as a national monument and state park. Through phenomenological and semi-structured interviews with community members, we seek to understand the implications of lived experiences in a Superfund context.

Superfund and Community Involvement

Superfund stems from federal policy, the 1980 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), which tasks the Environmental Protection Agency (EPA) with cleaning up these areas through remediation, restoration, containment, and monitoring activities (EPA, 2022a). Superfund's main objectives include the cleanup of contaminated sites that threaten human health and the environment, holding entities responsible (often the owner or previous owner of a site— potentially responsible parties [PRPs]), involving communities in the process, and ensuring the site can be used productively after cleanup (EPA, 2022a). The Superfund program requires community involvement throughout the cleanup process. In different phases of the process, such as proposed cleanup plans or final decisions, the EPA must notify the public through notices and advertisements and provide opportunities for public comment and meetings (EPA, 2020b). Over the years, federal policy and the EPA have aimed to better connect and incorporate communities (see Table 4.0). Certain directives and policies relate to Superfund specifically, such as the Superfund Amendments and Reauthorization Act (SARA) of 1986, a series of 1990 EPA directives, Superfund Community Involvement Handbooks, and a 2001 EPA directive. Others are linked to the program through federal or EPA policy like the EPA's 2003 public involvement policy, 2009 community engagement initiative, or 2014 environmental justice plan. Previous research has examined the successes and challenges of community engagement at Superfund sites and called for better collaboration and coordination between partners, translation of research for communities, evaluation of public participation programs, more specific definitions of community engagement, and a better understanding of social dynamics across diverse sites (Charnley & Engelbert, 2005; Cruz, 2019; Maxwell et al., 2018; Nagisetty et al., 2020; Zaragoza, 2019).

Table 4.0. Community Involvement in Superfund: Directives, Policies, and Initiatives

Community Involvement in Superfund: Directives, Policies, and Initiatives		
Year	Directive, Policy, Initiative	Community Involvement Activities
1968	National Oil and Hazardous Substances Pollution Contingency Plan (amended 1994)	Requirements include: conduct interviews with local communities to understand concerns and needs surrounding Superfund process; prepare a Community Involvement Plan; publish proposed and final rules in the Federal Register and allow for and respond to public comments; establish local information repositories; notify communities in a local newspaper that proposed and final plans and administrative records are available; allow for written and oral comments and public meeting on proposed and final plans and written response to significant comments; notify the public of consent decree, publish in Federal Register, and allow for public comment; provide fact sheets on completed remedial designs; provide public notice, public comment, and response to comment when site is listed for deletion from National Priorities List.
1986	Superfund Amendments and Reauthorization Act	EPA must publish in a local newspaper that documents are available in information repository and as notification for proposed plans, final plans, and changes to plans; create an administrative record of cleanup that is available to the public; provide opportunity for oral and written comments and public meetings on proposed and final remedial plans and provide responses to comments; provide technical assistance grants to interpret Superfund process and information; notify the public of consent decree, publish in Federal Register, and allow for public comment.
1990, 1991	EPA Office of Solid Waste and Emergency Response: Community Involvement Directives	A series of directives that provide guidance on conducting community interviews, responding to public comment, engaging with communities throughout all phases of the project, releasing timely information to the public, working with state and local officials to better communicate with the public, implementing specific community involvement techniques, maintaining engagement during EPA staff turnover, and incorporating public input into decision-making.
1995	Superfund Community Involvement Handbook (revised 2001, 2005, 2016, 2020)	Offers guidance, tools, and strategies for EPA Superfund site teams to plan and implement involvement in a manner that is consistent across sites. It provides information for involvement through each stage of the process (e.g., before, during, and after remediation or removal activities).
1996	EPA's Model Plan for Public Participation (revised 2013)	Promotes elements for conducting participation such as sufficiently preparing for participation, identifying participants, organizing logistics, and focusing on the process. It was later updated to address environmental justice challenges present in public participation.
2001	EPA Office of Solid Waste and Emergency Response: Early and Meaningful Community Involvement	Promotes six strategies for community involvement early in the Superfund process through the Community Involvement Plan, risk assessment, proactive community support like Technical Assistance Grants or Superfund Job Training Initiatives, early comment on remedial investigation/feasibility studies, and identification of future land use of the site.
2003	EPA Public Involvement Policy	Aims to increase acceptance, durability, and efficiency of EPA decisions by affirming the importance of early and meaningful engagement, considering interests and concerns of all involved, and encouraging and providing guidance on techniques and strategies for early and meaningful engagement.
2006	EPA Consulting with Indian Tribal Governments at Superfund Sites: A Beginner's Booklet	Provides information about government-to-government consultation with tribal governments and recommendations on how to conduct engagement appropriately.

2009	EPA Office of Solid Waste and Emergency Response: Community Engagement Initiative	Designed to enhance EPA relationships with communities and stakeholders through specific techniques and actions.
2014	EPA Policy for Environmental Justice for Working with Federally Recognized Tribes and Indigenous Peoples	Builds on previous EPA policy that established national guidelines for consulting with tribes and indigenous peoples and incorporates environmental justice tenets.
2014	EPA: Plan EJ	Builds on previous memorandum and recommendations and provides a strategy to incorporate environmental justice into EPA's programs, policies, and activities.

Sources: EPA, 2001, 2003, 2014, 2020b

While policies, directives, and plans signal progress and a continued commitment to community engagement, improvements can be made in how the EPA understands and works with a community. Community Involvement Plans (CIPs) are an important requirement and are implemented for remedial action or removal activities lasting more than 120 days, providing site-specific information and community engagement actions (EPA, 2020b). CIPs largely rely on defining and assessing the community with regard to the type and extent of contamination (EPA, 2019a). CIPs include community profiles and interviews but are limited in scope to contamination history and remedial actions, missing the deep social, cultural, and historical context. In most instances, only those explicitly involved or tied to Superfund (such as a technical advisory group, local government, or environmental nonprofit) are involved in a CIP, not the broader community (EPA, 2019a).

EPA directives and Superfund practitioners acknowledge the importance of community engagement and find it necessary for a successful cleanup (Maxwell & Kiessling, 2022), but there is a gap in their engagement approach. The narrative around Superfund sites is one of risk and contamination (Langhorst & Bolton, 2017; Messer et al., 2017; Shriver et al., 2020). This narrative extends to community engagement which primarily focuses on technical decisions about the cleanup such as remedial options, contaminant cleanup levels, and associated risk or

exposure (Maxwell & Kiessling, 2022). Furthermore, some within the EPA maintain the narrative that formally trained experts should retain decision-making authority and communities lack the expertise to provide input (Harrison, 2019). There is a need to develop and practice community engagement in a way that is informed by history, an understanding of complex relationships that influence decisions in post-industrial rural communities, and the lived experiences of individuals.

The Need for Lived Experiences

Communities with legacy pollution—pollution that remains for years after facilities or industries have left or decommissioned (Shriver et al., 2014)— have complex and interwoven identities and histories. They may be less likely to mobilize or protest compared to communities that experience an acute hazard, have familiarity with and acceptance of contamination, remain loyal to a previous industry in a company town, and assess risk based on different individual experiences (Auyero & Swistun, 2008; Johnson & Niemeyer, 2008; Kiessling et al., 2021; Messer et al., 2017; Shriver et al., 2014; Walsh, 1981). A federal agency's framing of risk and contamination based on technical data and scientific information may fail to resonate with and measure success differently from local communities (Langhorst & Bolton, 2017; Messer et al., 2017). Agencies may provide public engagement opportunities, which they deem successful, but stakeholders may come away dissatisfied if they are unable to provide sufficient input or understand how their input was used in decision making (Lauer et al., 2017). Remediation efforts prioritize certain values and knowledge and strive for efficiency and compliance without acknowledging the complexity of post-industrial landscapes (Beckett & Keeling, 2019; Joly, 2017; Langhorst & Bolton, 2017). Communities' lived experiences encompass more than just contamination, and often, the narratives or memories around the industry or benefits associated

with the contamination may be positive or nostalgic (Messer et al., 2015), rendering a mismatch between how the EPA and residents organize and interact with Superfund. The insight, knowledge, and narratives provided by lived experiences complement the Superfund cleanup process (Beckett, 2021; Bluestone, 2007; Robertson, 2006).

Phenomenology offers a unique approach to understand and interpret meaning in a contamination and post-industrial setting. It aims to understand phenomena and lived experiences from a first-person perspective (Connelly, 2010; Creswell, 2007; Kvale, 1996). This approach provides a different way of knowing through narratives, historical legacies, and memories (Thomas, 2005; Wilde, 1999). A phenomenological approach involves the body, where it is in a relationship with and not separate from the mind and the outer world (Pollio et al., 1997; Thomas & Pollio, 2002). One's body is then "the subject of perception" through which we experience, perceive, and know the world (Allen-Collinson, 2009, p. 283; Wilde, 1999). Part of lived experience involves embodiment, where the world is experienced and understood through the body using the senses— sight, touch, sound, taste, and smell (Wilde, 1999). Emotion, language, and perception are also part of the lived experience, as they are not separate from the physical activities undertaken by the body, but also shape our surroundings and our experience in the world (Davidson & Milligan, 2004; Merleau-Ponty, 1962; Wilde, 1999).

The majority of Superfund work involves cleaning up a site through remediation, restoration, containment, treatment, and removal activities. Restoration scholarship has emphasized the need to acknowledge and incorporate social, cultural, and historic objectives and contexts when assisting the recovery of an ecosystem (Havlick & Doyle, 2009; Hourdequin & Havlick, 2016; Higgs, 2003; Gann et al., 2019). Scholars have argued for practitioners to embrace "layered landscapes" which hold various meanings and values and invite conversations

around heritage, memory, and healing (Beckett & Keeling, 2019; Hourdequin & Havlick, 2016; Langhorst & Bolton, 2017). These ideas become more complicated when addressing remediation— removal or mitigation of pollution and contaminants from soils and water sources— which engenders a positive association of cleaning up or improving a place or landscape (Beckett, 2021; Beckett & Keeling, 2019; Gann et al., 2019; Hourdequin & Havlick, 2016). Remediating an area, especially a complex Superfund site, requires attention to and incorporation of complicated historical legacies and narratives connected to the site (Beckett, 2021; Beckett & Keeling, 2019; Joly, 2017; Langhorst & Bolton, 2017). Our work contributes to this conversation by illuminating how agencies can accomplish this on the ground during the cleanup process. Maxwell and Kiessling (2021) proposed a methodology of culturally informed cleanups as a strategy for EPA practitioners to bridge cultural divides by gathering information about community characteristics and the local cleanup situation. They also recommended methods to collect data and create a cultural learning plan (Maxwell & Kiessling, 2021). Our work offers lived experience as additional and critical insight for culturally informed cleanups, beyond the focus of contamination and risk and for practitioners designing Community Involvement Plans.

Study Area Description

The town profiled in this study is Anaconda, part of the Upper Clark Fork Watershed in the state of Montana. In 1883, Anaconda was established to process and smelt copper ore mined 26 miles southeast in Butte. The first smelter, the Upper Works, came online in 1884 with the capacity to treat 500 tons of copper ore per day, and five years later, a larger smelter, the Lower Works, opened (Quivik, 2017). Both smelters operated together until the Washoe Reduction Works smelter opened in 1902 across town, boasting the ability to treat 8,000 tons of copper ore

daily (Quivik, 2017). The Washoe Reduction Works utilized a 585-foot smokestack to expel vast amounts of smoke from the operation (Quivik, 2017). The smoke from the stack produced widespread contamination from heavy metals emitted (e.g., arsenic, zinc, cadmium, copper) and deposited on homes, buildings, residential lawns, parks, common spaces, and water sources— stretching across the Deer Lodge Valley and surrounding foothills. The smelting operation also produced large amounts of waste— flue dust, tailings, slag— that was not properly disposed of and contaminated soils and water (EPA, 1994, 1998, 2011).

In 1983, the EPA designated the town and the adjacent 300-square-mile area the Anaconda Co. Smelter Superfund site. The Anaconda Superfund site is part of the Clark Fork River Superfund Complex, which includes other sites (Silver Bow Creek/Butte Area and Clark Fork River/Milltown Reservoir) and is one of the largest complexes in the United States (Figure 4.0) (EPA, 2023b).

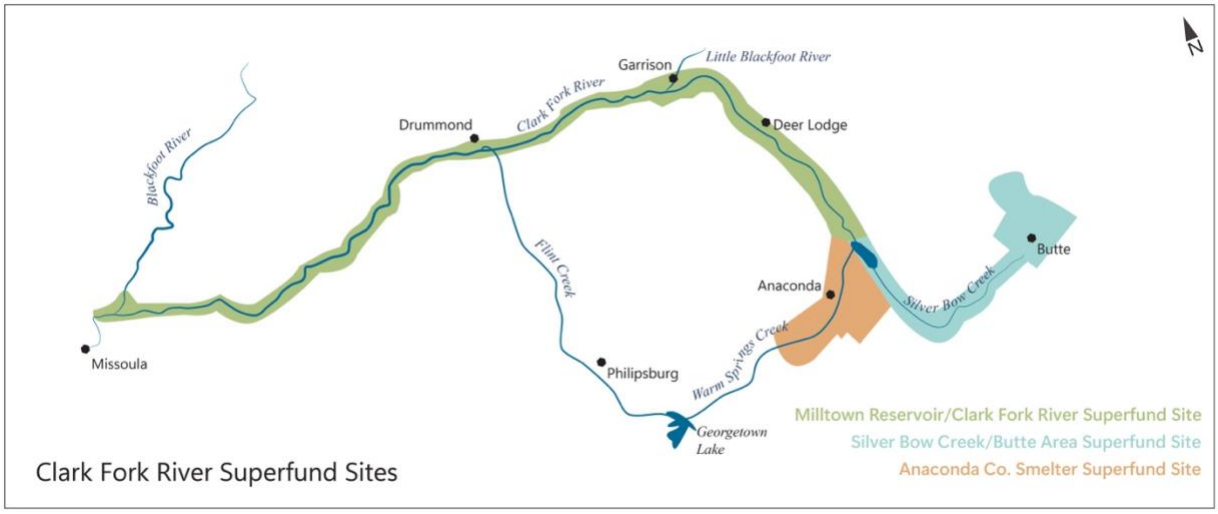

Figure 4.0. Map of the Clark Fork River Superfund Sites. Source: Amy Katz.

Initially, due to the size and complexity of the Anaconda site, the EPA broke it into 16 operable units which were later combined into five active operable units (EPA, 2020c). Some of

the operable units are further divided into subareas for management and efficiency (EPA, 2020c). The five active operable units include Mill Creek, Flue Dust, Old Works/East Anaconda Development Area, Community Soils, and Anaconda Regional Water, Waste, and Soils (ARWWS) (Figure 4.1). Each operable unit has a record of decision, which is a document that contains the remedial action and process for cleanup, alternative remedial actions, and justification for the chosen action. Two early operable units, Beryllium and the Arbiter (located within ARWWS), and the Flue Dust operable unit have met cleanup requirements as the response actions and remedies remain protective of human health and the environment. They were recently partially deleted from the National Priorities List in 2020 (EPA, 2023b). In early 2023, the EPA proposed a partial deletion for the Mill Creek operable unit (EPA, 2023b).

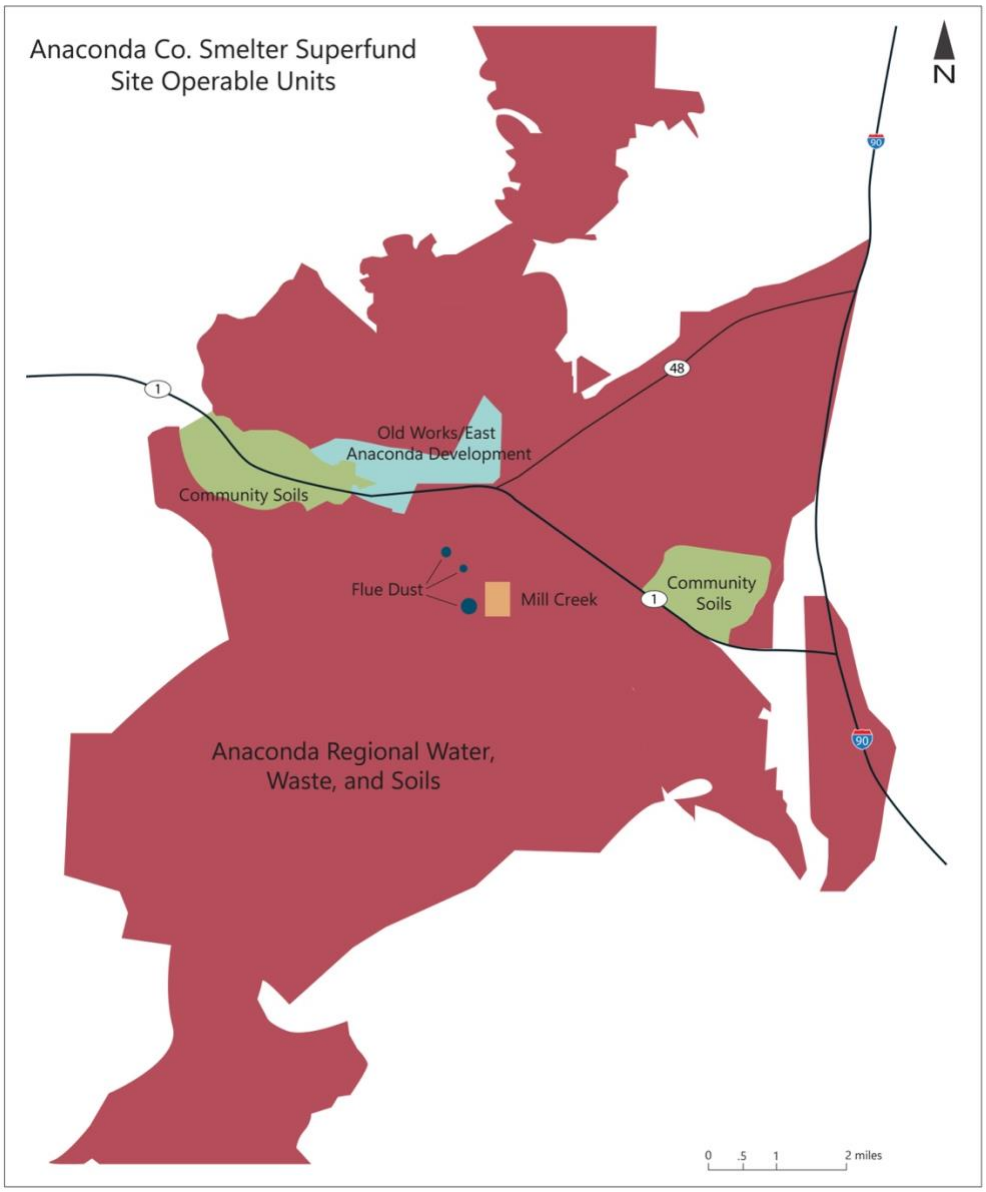

Figure 4.1. Map of the Anaconda Co. Smelter Superfund Site Operable Units. Source: Amy Katz.

The potentially responsible party (PRP) for the Anaconda Superfund site is Atlantic Richfield, a subsidiary of British Petroleum. In 1977, Atlantic Richfield bought the Anaconda Company and quickly closed the smelting operation three years later. For almost 100 years, the Anaconda Company was the primary industry and employer in Anaconda. As a company town, Anaconda experienced the impact and effect of the Company in its presence and absence

(Mercier, 2001). In its heyday, the population of Anaconda reached around 18,000 people (ADLC, 2019). The Company provided services and infrastructure such as water and sewer, building facades, streets, cemeteries, common spaces, parks, and streetlights maintenance, and facilitated annual events like the Christmas tree unveiling in the city commons (Lauren, 1970; Mercier, 2001). The day smelter closed, what was known as Black Monday, signaled a shift for those living in Anaconda (McNay, 1982). In the following years, many felt that the stigma from Superfund and the lack of opportunities in Anaconda left it floundering— losing 3,000 residents in 10 years, many young people left for college and did not return, and many proposed business ventures fell through (Adams, 2023; Everett, 2022).

Some suggest the tide has turned in Anaconda, from being named a "sad sack smelting town" in the 1990s by Travel and Leisure magazine to recently a "county reborn" in Business View magazine (Adams, 2023). In the past decade, Anaconda has positioned itself as a tourism and recreation destination and prioritized development, seeing new residents move to town, new businesses open or relocate, and increased housing demand (Adams, 2023; Thorton, 2021). As of 2019, Atlantic Richfield has spent $470 million on site cleanup (Barnes, 2019). Settlement agreements between Atlantic Richfield, EPA, and Anaconda-Deer Lodge County have also stimulated economic development, with $28 million earmarked for it, including $3 million toward a new hotel, $2 million to renovate the Old Works Golf Course, and $1 million each year for 25 years for general economic development (Cast, 2021; McCumber, 2020).

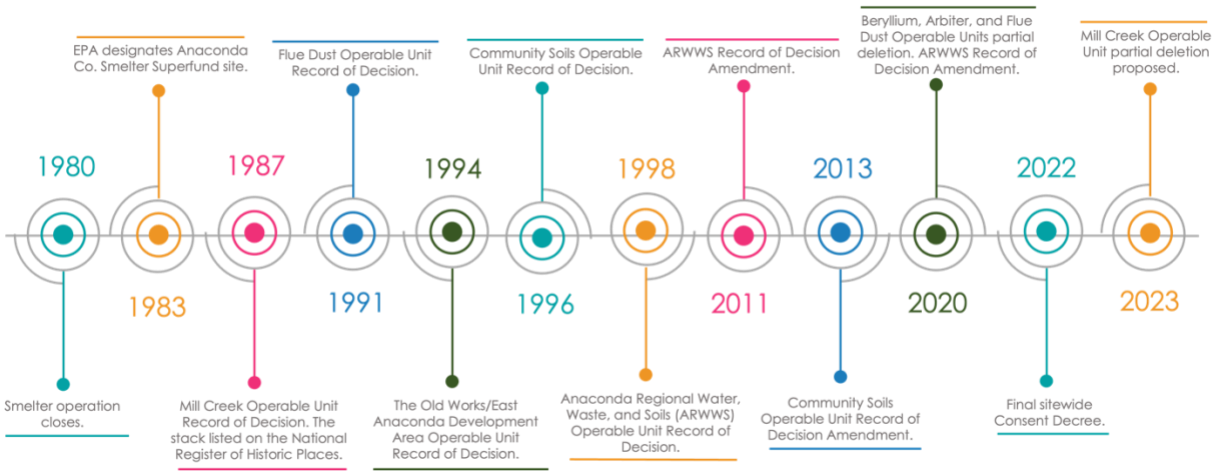

Figure 4.2. Timeline of Superfund Related Milestones

The EPA and Atlantic Richfield aim to complete remediation activities by 2027 (EPA, 2022b). The entire site would not be de-listed from the National Priorities List immediately but will require additional years of monitoring with continuing maintenance and operation activities. Institutional Controls and the Community Protective Measures Program run by Anaconda-Deer Lodge County support the completed remediation, containment, and other cleanup work. Institutional Controls, with funds from Atlantic Richfield to run the program, minimize contamination exposure and ensure the integrity of the remedy through subdivision requirements, preservation of engineered caps and water storage areas, and compliance with new construction practices within the site (ADLC, 2023; Dunlap, 2017; EPA, 2022b). The Community Protective Measures Program focuses on resident safety, especially in their lived spaces, providing information and assistance with attic dust removal, swapping lawn soil or building garden beds, domestic well testing, blood lead monitoring, and identification of contamination on property before digging or construction (ADLC, 2023; EPA, 2022b).

Methods

We conducted a qualitative study using phenomenological and semi-structured interviews to learn about community members' experience living with the Anaconda Smelter Stack (hereafter 'the stack'). As a methodology, phenomenology maintains that our bodies' interactions with the outer world and others shape our perceptions and realities (Jamison & Muth, 2022; Thomas & Pollio, 2002). The purpose of phenomenological interviews is to understand and learn about what is meaningful, and what stands out, for someone during an experience (Jamison & Muth, 2022; Pollio et al., 1997). Phenomenological interviews are rooted in stories, glean rich descriptions, and reveal the perceptions of meaning through a conversation rather than assessing knowledge or attitudes (Gruver et al., 2017; Jamison & Muth, 2022). We built on our previous work in the community where the stack emerged as a landmark that perpetuated particular collective memories. In this method, we used stories to uncover how the stack impacted community members' experiences and the implications for the cleanup process.

Interviews were conducted by the lead author. She used one opening question as a prompt for interviewees to share their stories; the rest of the interview was unstructured. Follow-up questions were based directly on what interviewees had said— words, phrases, or a tone that stood out or was repeated in their stories. She did her best to create an informal and comfortable space for interviewees to discuss their experiences. To complement the phenomenological portion of the interviews, she ended each interview with 11 questions from a semi-structured interview guide (Appendix D). These questions provided demographic information and confirmed details of the interviewees' experiences.

To account for her positionality as a researcher, she utilized a bracketing interview and field notes. A bracketing interview, where she was the interviewee, helped her understand

presuppositions and biases related to Anaconda and the stack before embarking on interviews (Thomas & Pollio, 2002). After each interview, she recorded field notes to capture her insights and perspectives of the interview, the nature of the interview and emotions related to it, and how she may better conduct subsequent interviews. The bracketing interview and field notes brought more self-awareness about her role as a researcher, her effect on the questions posed, and her interactions with interviewees (Berger, 2015).

Our purposeful sample included potential interviewees who lived in Anaconda while the smelter was operational and for some time after it closed. To contact potential interviewees, we sent out a letter to our contacts in Anaconda who forwarded it to community members. Our community contacts also recommended various residents to speak with, some of whom met our criteria. We also handed out this same letter to community members we met during various events during the annual Smeltermen's Days celebration in August 2022. We also frequented community establishments during the summer of 2022, including bars, restaurants, and cafes where we informally engaged and talked with community members, resulting in potential interviewee contacts.

We conducted 22 interviews with community members from August-October 2022. With the exclusion of one interview conducted via Zoom, all interviews were conducted in person with the location chosen by the interviewee— we conversed in bars, cafes, park benches, dining rooms, and backyards. All interviewees— except four born in neighboring towns or who moved to town when they were young children— were born in Anaconda, grew up there, and lived in town when the smelter was open. Some left for college or to pursue other work for a few years or many years, but then made their way back. Interviews were audio recorded following participant and Institutional Review Board approval (#111-22).

Recorded audio files were transcribed. The phenomenological interviews were analyzed individually, collectively with a research group, and in pairs with members of the research group. The research group consisted of experienced qualitative researchers that read each interview together and discussed the language, phrases, metaphors, and tone of the participants. The research group served a recognition function and provided validity for the themes (Thomas & Pollio, 2002). As part of an iterative process, we examined how parts of individual transcripts related to one another and were also understood within the broader context of the interviews (Laverty, 2003; Thomas & Pollio, 2002). We then compared the findings from the group with individual and one-on-one findings. The cross-interview findings illuminated what was meaningful for interviewees in their experience of living with the stack. Themes were then developed based on experiences across all interviews. We analyzed the semi-structured interviews in NVivo 12 separately and then across interviews. The semi-structured interviews supported the themes we found in the phenomenological interviews.

We also utilized EPA public documents to ascertain how the EPA made decisions regarding the site, the data it used, and the information it shared with the public. We bounded our search temporally between 1983 and 2023 and limited EPA documents to those specifically about the Anaconda Co. Smelter Superfund site (e.g., remedial investigations, records of decision, Community Involvement Plans, five-year reviews, fact sheets).

Limitations

We asked interviewees about a time when they were made aware of the stack. For many residents, the stack existed in the background of their everyday lives rather than something that was figural. Our opening question may have limited interviewees' stories as we did not ask about a specific event regarding the stack, such as a strike or its closure. However, we were struck that

when we asked about the stack, community members associated it with their broader community experience. They interpreted an interest in the stack as an interest in the smelter operation and their community. Our sample was chosen to include people that had significant tenure in Anaconda, including those who had experienced the town with and without a smelting operation and the Anaconda Company. Younger generations most likely have different memories and perceptions around the stack, smelting operation, and the Anaconda Company.

Results

We present our results as a juxtaposition of how the EPA defined the Superfund site by contamination, risk, and operable units and how the community experienced those phenomena.

An EPA Lens of Contamination

The EPA defined contamination through cause and effect— milling and smelting operations expelled heavy metals and deposited them throughout the valley and produced untreated waste (EPA, 1987, 1991, 1994, 1996b, 1998). Heavy metals such as arsenic, lead, cadmium, zinc, and copper were identified as contaminants and waste piles consisted of smelter byproducts like slag, tailings, and flue dust. The EPA considered contaminants and waste an issue when they affected human health, plants, terrestrial and aquatic organisms, wildlife, crops, forests, rangelands, riparian areas, and water sources (EPA, 1987, 2020c). Contamination in different areas was characterized by its remedy— if it could be chemically treated, required excavation and removal, could be left in place, could be revegetated or assisted with other measures, or needed to be buried and covered. Areas within the Superfund site were differentiated by what was clean and what was contaminated— areas that have been cleaned up, areas that need to be cleaned up, and areas that could not be cleaned up. High levels of

contaminants, such as 250 parts per million (ppm) of arsenic or 400 ppm of lead in residential soils, 500 ppm of arsenic in industrial soils, blood lead levels in children more than 10 μg/dL, or 37 μg/L of zinc and 2.85 μg/L of copper in surface water reaches required remedial actions (EPA, 1987, 1994, 1996b, 2020f). The EPA communicated the status of contamination through progress reports and fact sheets with a focus on visual changes to or sounds on the landscape such as construction backhoes on hillsides, helicopters spreading seed, trees and shrubs planted on steep slopes, heavy equipment removing old railroad beds, and residential yards with new sod (EPA, 2017b, 2020e, 2021a). Progress was measured numerically: less arsenic and lead ppm in soils, number of acres revegetated, inches of soil excavated and replaced, feet of stormwater controls placed, cubic yards of waste moved and buried, miles of streambank stabilized, lower blood lead levels, and number of attics tested and cleaned (EPA, 2015, 2017b, 2020c, 2020e, 2021b).

Community Experience: Beyond Contamination

For community members, contamination was multisensory and interwoven in their personal and work lives. They experienced the stack through the smoke that blew out of it every day for almost 100 years. Interviewees described the taste, smell, direction, and nature of the smoke. Natural and man-made elements collided in their experience, where the wind would dictate the direction of the smoke, if it would blow through town, hover over due to a lack of, or be pushed to the outskirts. One interviewee remembered:

> And in the morning when you get up, you want to see how the weather was doing, especially the wind. When there was a lot of wind, you'd look at the stack and watch the smoke at the stack to determine what kind of a day it's going to be… Are we going to have a lot of wind? Is it going to be a nasty day or going to be a good day or whatever. (Interviewee 10).

While the wind could determine the outdoor conditions and duration of the arsenic-filled smoke lingering over town, it was often met with acceptance from community members— as a part of life and a part of life that provided:

> Well, you just dealt with it, I mean there's nothing else you could do. You just went out, your eyes would kind of water and your mouth, you would just taste the sulfur in the air. But it's just the way it was. There was days you'd get it all week and there's days you wouldn't get it for a month and you just got used to it I guess. (Interviewee 8).

The smoke coming from the stack was commonplace for the community— a taste and scent they could never forget. Some were surprised that outsiders were not familiar with the taste and scent when they described it— "there was a scent to it… you know?" (Interviewee 9). Interviewees experienced the intensity of the smoke differently. One interviewee said, "I remember waking up, the arsenic. The taste of arsenic was horrible with that taste in your mouth. You'd wake up and it would be just a rank taste. And we would complain, we'd want our juice or our water, and we'd complain to mom and dad." (Interviewee 16). Another interviewee agreed that the arsenic taste was unique but bearable, "Well, it's a different taste. I mean, it wasn't gagging, you weren't going to die from it. But you definitely knew." (Interviewee 17).

Interviewees' experienced contamination through their work at the smelter operation. The intense physicality was made manageable by camaraderie, good pay and benefits, and coping mechanisms. They described the operation as a dirty, hot, and often dangerous environment. In some departments, workers wrapped themselves in gauze and used bamboo rods to knock arsenic off hanging chains. Others wore face shields and respirators to protect themselves from the dust as they navigated through departments with 12 inches of visibility. One interviewee described his work at the smelter:

> Well, let's see. The smell there, it was a shit hole. Unbelievable. There were places that were so dirty and arsenic and dusty and gassy, certain departments. Oh. It was like being in hell. It really was. They give you a lousy respirator that had to have canisters on the side. They were heavy. It was not a good place to work for health reasons. Well, I'm 75 now. I can't believe I made it this far. (Interviewee 5).

Humor and camaraderie helped to balance out the danger, risks, and reality of the job, as one interviewee said: "They made it fun. They taught me so much stuff… This one guy I worked with, he grabbed me by the ear and dragged me around. And everybody jumped on top of you. So yeah, it broke up the monotony of the job" (Interviewee 12). An element of coping happened at the smelter that was interconnected with the fun times: "Oh, these guys were always fun. They were always playing tricks on somebody or jokes. Like I say, some of them coming to work kind of drunk." (Interviewee 6).

Drinking was an accepted coping mechanism in the community that extended beyond the smelter into family life, long hours, or multiple jobs that kept some parents from being present at home. One interviewee discussed the compassion she thought existed in her own life and in the community around alcoholism:

> But my cousin who teaches at the university, actually, went with a guy and I said, "Are you still going with that guy?" And she said, "Oh no, I had to break up with him." And I said, "Why?" And she said, "You know, he never experienced alcohol." She said, "He had no compassion." And I said, "Well, isn't that a good thing that you don't experience alcoholism?" And she said, "No, there was something missing in that kind of person." (Interviewee 20).

Some interviewees hinted at the tension of working at the smelter, while it provided opportunities for their parents, the conditions and work made them not follow in their family's footsteps, as one interviewee said, "My father was about the only one that ever worked there... That's all he did was work at the smelter and none of us ever... I had two brothers and we got out

of there." (Interviewee 14). Another interviewee added, "I worked in the reverbs, and it was a hot place to work. I just worked there for a few months and then at the stack for a few months. The only thing I really remember was a hot, dirty job. I didn't want to work there very long." (Interviewee 7).

EPA and Risk Definitions

Risk motivated the EPA's remedial actions and decisions during a cleanup, where the objective was to eliminate, reduce, or control exposure through remediation (EPA, 2020f). Through assessments and data collection, the EPA defined risk by the presence and severity of contaminants, the pathways for exposure, the amount of people or things (e.g., aquatic life, wildlife, soils) exposed, and the type of risk (EPA, 1987, 1991, 1996b, 1998, 2020f). The EPA prioritized site cleanup by focusing on operable units with extremely high contaminant levels or threat of exposure; the Mill Creek, Beryllium, and Arbiter operable units were addressed first. Acceptable contaminant levels— arsenic in soil and waste, lead in blood, copper in surface water— were selected based on risk management considerations (EPA, 2011, 2013). Exposure pathways for humans— ingestion of soils, interior dust, and groundwater—were separated by populations like residents and children, agricultural workers, recreational users, and commercial workers (EPA, 1996a, 1998). Exposure pathways for wildlife included terrestrial and aquatic plants, aquatic organisms, insects, and herbivores (EPA, 1996a, 1998). Remedies were chosen, in part, to reduce risk and limit exposure pathways (EPA, 2011, 2013). Risks were also characterized and deemed unacceptable when they impacted public health such as 5% of children having blood lead levels over 10 μg/dL or if the probability of a resident developing cancer exceeded 1 in 1,000,000 (EPA, 1996a). In some instances, streams showed high levels of contamination, such as arsenic concentrations, which exceeded drinking water regulations.

However, since these streams were not intended for drinking water purposes, the risks were considered low and the standards were waived (EPA, 2011, 2019b, 2020f). Throughout the years, the EPA updated remedial actions and institutional controls to reflect better understandings of risk or new exposure pathways such as the inclusion of testing and remediating residential soils for lead levels, increased funding for the attic dust program, and a program to track and monitor new domestic wells (EPA, 2011, 2013, 2020f, 2020g).

Community Experience: Beyond Risk

The community experienced risk in a broader sense as a trade-off and acceptance of living in a company town. The community experience was inextricably linked to the Anaconda Company. The Company's reach into daily community life was often experienced as a paternal gift and blessing, where residents felt cared for. Some community members described the Company as being good to the community in ways that were often not appreciated like a high school sports stadium on par with college stadiums or the funding for driver's education simulators in the school basement. Some felt that the community did not understand just how good they had it. Many looked back fondly on the Company, often talking about it and the smelter operation interchangeably and calling one or both "the Hill." As one interviewee said, "The Hill was very good to the town. They gave us Washoe Park. They funded a lot of things in town for the people to do and buildings and stuff. They were very good to the town." (Interviewee 2). The extent of the Company's influence and funding ran deep beyond town infrastructure, services, and amenities to kids' sports which relieved the burden from parents and families. Exemplified by one interviewee:

> But it was everything. I mean our sports teams, our high school sports teams, the company shirt… you never bought anything. They got your jerseys, they got your cleats,

> your shoulder pads, your helmets, your undershirts, your socks, your jock, everything. They bought everything for you. So your parents didn't have to worry about it. (Interviewee 8).

The company also offered temporary employment to community members once they turned 18 years old or needed work. Many spoke of the ease of wanting to get a job on the smelter for the summer and starting work the next day. The accessibility of getting a job at the smelter created opportunities, primarily around education, for younger generations of Anacondans. The pay at the smelter for one summer was enough to cover one year of tuition at local universities. As one interviewee said, "There wasn't a kid that needed a job that they didn't give a job. They [the Company] relished in the fact that if you came home in the summer from college, you can get to the Hill. And they paid good. They paid good." (Interviewee 2). Another went further in terms of the Company's contribution to the community:

> They would hire a couple hundred kids every year. If you got a job on the smelter making $4, $5, $6 an hour in those days, that was big money. If you worked on the smelter, you could make enough money to pay your tuition and fees for the year. The Anaconda Company probably put more kids through college than any other institution in this area. (Interviewee 18).

For many, the smelter provided a living wage for a family along with various benefits (though many of these were secured by the unions) such as retirement and health insurance. As one interviewee said, "And then oftentimes the most coveted jobs were getting employed by the smelter because they paid so well." (Interviewee 4).

Part of interviewees' experiences included the precarity of living and working in a company town. Union strikes on the smelter were a familiar occurrence in the community and materialized every few years, with a strike in 1959 lasting six months across the Company's operations in Anaconda, Butte, Great Falls, and Helena (Quinn, 1960). Strikes highlighted the

duality of living in a company town described as idyllic, with strong community ties, daily smoke that puffed from the stack, and abundant resources while residents also lived at an economically thin margin. For interviewees, the absence of smoke signaled negative material effects on families, their ability to earn a paycheck, and buy essentials such as groceries and utilities:

> I mean, I remember through the strikes that there wouldn't be smoke coming out. And that was very weird. Every three years, the unions were striking... You'd get ready for it. And every neighborhood had a little grocery store, their own little grocery store. And they would carry their neighbors up in the, probably the thousands for groceries, until the strike was over. And then everybody would go back to work and pay off their food bill. (Interviewee 3).

Another community member confirmed this sentiment:

> Life got pretty darn lean. I'd be down visiting the head of Montana Power every month, paying them $10 to keep the power on for the next month. Because your money just stopped, you didn't have money coming in. And then we had grocery stores in this town that you charged, and then when you got caught up, when you went back to work, you paid them (Interviewee 15).

This interviewee also touched on the predicament many families were in, which was a scramble to find alternative work while the smelter was closed. Men commuted out of town for work, left for a few months at a time to work, or women and men picked up odd jobs to help bring in a little money— "So during that strike, sometimes you could go out and make a few dollars picking potatoes." (Interviewee 15).

The EPA and Operable Units

The EPA defined space in the site by operable units. Due to the size, diversity, and complexity of the site, the EPA divided it into sections to address and manage similar

contamination issues. Through the cleanup, operable units were combined, and recently, partially deleted from the site. Five active operable units remain: Mill Creek, Flue Dust, Old Works/East Anaconda Development Area, Community Soils, and Anaconda Regional Water, Waste, and Soils (ARWWS). Thirty-seven families lived in the unincorporated Mill Creek neighborhood adjacent to the smelter complex (EPA, 1987, 2023b). Due to elevated levels of arsenic in children and continued exposure to flue dust after initial efforts to clean the homes, families were permanently relocated. The neighborhood was demolished, the area revegetated, and the waste removed (EPA, 1987, 2023b).

The EPA saw the Flue Dust operable unit as the second most critical to clean up after Mill Creek (EPA, 1991, 2020c). Flue dust, a by-product of the smelting operation that contains high concentrations of heavy metals, was often reprocessed though much of it was stored on the hill (EPA, 1991). Flue dust was seen as a threat to human health and the environment since it can be moved or eroded by the wind and deposited across town or sink further into the soil and groundwater (EPA, 1991). As part of the cleanup for this unit, an 11-acre on-site repository on the hill was created to hold 500,000 cubic yards of flue dust (EPA, 2015). The EPA found the stack to be less contaminated than other areas. The remaining flue dust within the structure was contained without exposure to the community (EPA, 1994).

The contamination in the Old Works/East Anaconda Development Area operable unit stems from a large volume of smelter waste like tailings and slag. This unit includes recreational and industrial areas such as the former location of the Upper and Lower Works smelting operation and the Arbiter plant complex (EPA, 1994). The EPA acknowledged the need for historic preservation of industrial ruins and preserved and incorporated some of them into the Old Works Golf Course which was formerly 250 acres of tailings and contaminated soils (EPA,

1994). As the name suggests, this operable unit is poised for economic redevelopment as remediation and other cleanup actions conclude in subareas.

The Anaconda Regional Water, Waste, and Soils (ARWWS) operable unit is the largest of the Superfund site— spanning 20,000 acres (EPA,1998). Due to the complexity and scale of this operable unit, it was further divided into 15 smaller remedial design units (EPA, 1998). These remedial design units include Warm Springs Creek, Lost Creek, and Mount Haggin Wildlife Management Area (EPA, 1998, 2011). For ARWWS, the EPA waived the state of Montana surface water standards as they were not achievable in certain stream reaches (EPA, 2011, 2017a, 2020d). The Community Soils operable unit encompasses residential and commercial soils (EPA, 1996b). Throughout the community, residential yards had high levels of arsenic and lead in surface and subsoils, which required excavation and replacement of 12 inches of soil (EPA, 1996b, 2020c, 2020e). Thus far, 1,228 yards have been remediated (EPA, 1996b, 2020c, 2020e). The EPA also advised homeowners to contact the county if they planned to disturb the soil in their yard such as planting a tree or starting a garden (EPA, 2020c).

Community Experience: Beyond Operable Units to Spaces and Places

For residents, places within their community and the broader landscape held meaning and were denoted by landmarks like the stack, community connections, and outdoor experiences. The stack functioned as a landmark and monument— beaconing those traveling home. Towering above the eastern part of town at 585 feet, the stack was a fixture on the landscape and deeply intertwined with interviewees' feelings of home and their community. One interviewee simply stated, "Yeah, it was a part of my life ever since I can remember." (Interviewee 7). Interviewees saw the stack as comforting and reassuring as they traveled home— a mile marker on the journey: "Whenever you left and went anywhere, when you could see the stack, you were

home." (Interviewee 6). The stack was part of the community fabric, and many interviewees did not differentiate between the stack, smelter operation, the Hill, and their community when they discussed their experiences. As one interviewee said, "It's always just been here. Even when we travel to Butte, when you come around Fairmont Hill, you're looking for the stack, you're looking for that familiar site. Or when you're coming from Warm Springs, you're looking for that familiar stack. So I don't know this place without it." (Interviewee 22).

Interviewees discussed their friendships and community relationships as an integral part of their community experience, where everyone knew everyone, welcomed them in, left the doors unlocked, and kept the kids in line— acting as an extension of their family. One interviewee said she treasured her experience of the community as a support net:

> Well, everybody knew everybody. Everybody knew everybody, their name, and their mother's maiden name. The family home, where the family home was. Yeah, you didn't get away with anything. God forbid, [you] as an older, maybe teenager, tried to smoke. Oh my god. Yeah. Your mom knew about it before the cigarette was out. People helped raise other people's kids unintentionally. Because you always knew someone's eyes were on you. (Interviewee 16).

While community members were aware of the smoke or denuded foothills (some were tasked each year to plant trees with their school), it was only a part of their experience growing up in Anaconda. The outdoor spaces from neighborhoods to the commons to parks to residential lawns to recreation areas brought together droves of children and afforded them the freedom to play baseball and football, host marble tournaments, ice skate, ski, hunt, camp, hike, and fish. One interviewee described growing up:

> Well, there were all kinds of things for kids to do. It was a safe environment. When we were eight and nine years old, if we wanted to go camping, mother said, "Okay, I'll see you tomorrow." You'd walk on up, go on up the gulch and set up, cook dinner, sleep out overnight and come back the next day, check in. (Interviewee 18).

Interviewees emphasized how much time they spent in various outdoor spaces —many of their social interactions, memories, and activities occurred there. Their parents set them loose all day and they needed to be home for meals or when the streetlights came on at night. The connection to the outdoors rooted many to Anaconda and the surrounding forests and wilderness:

> We went out and we built cabins out in the mountains, because we lived up west, so the mountains were out the backdoor. We would chase the bears away with sticks. It was nothing for us to spend the entire summer and never see a television program. We would go swimming in the creek. We didn't have videogames. We didn't depend on anything that costed money to have fun. (Interviewee 21).

There was always something to do, and often a line to get on a team for a pickup game: "But it was a great place to grow up. Had fun, man. Especially over there. Geez. You'd open the door and there's a football game going. Baseball. Guys are going fishing in the creek or here or there. You just open the door and they're all there. Lots of kids." (Interviewee 5).

Discussion

Overlaps and gaps exist between how the EPA and local community understand contamination, risk, and the landscape. The EPA calculated contamination and risk based on technical data, assessments, and public health standards. For residents, contamination and risk were only part of their rich experience growing up and living in Anaconda. The rewards of their community experience — community connections, support from the company, and childhood nostalgia— outweighed the potential risks that came with living there. Risk and contamination were trade-offs to live and work in a company town, accepting the risks of working at the smelter during the summer to pay for school or dealing with the economic uncertainty brought by strikes because of the tight knight community that rallied together and supported one another. Often, the

EPA maintained a narrow understanding of contaminants by action levels, extent, and exposure but in one instance, the 1992 Anaconda CIP did note that residents were familiar with the taste of arsenic, though the focus was more on residents' awareness of the smelting impact on the environment (EPA, 1992). Interviewees saw the smoke as a given in the community, though often a nuisance, it signified food on the table, jobs for parents and themselves, and a thriving town. The EPA's community profile of Anaconda in the early CIPs (e.g., 1985, 1992) was centered on health risks and economic development but did include the community's historic preservation concerns and concerns about the primary industry leaving (EPA, 1985, 1992).

Interviewees' lived experiences speak to how industrial infrastructure became important sites of collective memory. Like other post-industrial communities, interviewees attached meaning to their community and mining landscape even after the industry had left (Marsh, 1987; Robertson, 2006; Skeard, 2015). This can cause tension between agencies and communities in their understanding of place and priorities for cleanup (Kiessling & Maxwell, 2021; Messer et al., 2015; Robertson, 2006). The stack, a site that perpetuates collective memory for the community and grounds them to place, was first evaluated by the EPA in terms of flue dust levels. As Anaconda was designated a Superfund site, Atlantic Richfield was planning to demolish the stack and smelter operation (McNay, 1983). Citizens formed a group, "Anacondans to Preserve the Stack," and convinced the EPA and lobbied the state legislature to save the stack— leading to a state park designation in 1987 (ADLC, 2021; Kemmick, 1984; Simpson, 1985). In hindsight, many interviewees discussed that they were both happy the smelter had closed and that the stack was saved, emphasizing the importance of preserving and protecting narratives, memories, and histories during the cleanup process (Coates, 2016).

This demonstrates the complicated relationships people have with industrial landscapes, and that understanding these complexities is critical for EPA cleanup and engagement efforts. Superfund sites are primarily seen as products of mineral extraction, decay, contamination, and risk (Joly, 2017; Langhorst & Bolton, 2017; Robertson, 2006) but deserve to be assessed holistically with informed historical and cultural contexts. Interviewees provided a counter-narrative, one of deep connection to place and community, to the contamination and toxicity narrative of Superfund and remediation projects (Beckett, 2021; Beckett & Keeling, 2019; Messer et al., 2017). The EPA has taken steps to incorporate historic elements into remedial designs for operable units, such as the Old Works Golf Course, which features flues, smelting ovens, and tailings throughout the course (EPA, 1994; EPA, 2007). While the National Historic Preservation Act (NHPA) of 1966 requires that federal agencies take stock of historic resources, it leaves them with latitude and power in the identification and handling of these sites (Romeo, 2019; Quivik, 2001). Some argue that the EPA's historic preservation efforts during remediation remain inadequate— prioritizing their cleanup objectives and neglecting in-depth interaction with historic preservation (Morin, 2009; Quivik, 2001, 2007). The Old Works Golf Course required extensive excavation of furnace ruins to complete, which Quivik (2001) argued did not properly address historic preservation efforts. Through engagement efforts rooted in a historically informed approach, the EPA can continue to follow NHPA requirements while potentially arriving at better solutions for preservation and incorporation of historic features. The EPA can also motivate community buy in during the cleanup process with more attention to historic preservation.

Recommendations

Our findings support Superfund objectives and Community Involvement Plans. The protection of human health and the environment cannot rely on scientific and technical knowledge alone. There have been recent calls from within the EPA for a more culturally informed cleanup process (Kiessling & Maxwell, 2021; Maxwell & Kiessling, 2021). However, similar to other federal agencies, dissemination and implementation throughout the agency can be uneven, take time, or fall through the cracks. For many staff, their understanding and perceptions of the EPA as a science agency results in unwillingness to promote broader objectives, like environmental justice (Harrison, 2019). Equity and fairness for communities hinges on how environmental cleanups and policies are implemented (Harrison, 2019). As of this writing, EPA Region 8 has not implemented Maxwell and Kiessling's (2021) framework and was not aware of individual community involvement coordinators implementing it. They did state that environmental justice components are present in their planning efforts (EPA region 8 official, personal communication, 3/7/23). The EPA continues to rely on technical data to inform their cleanup decisions, such as in the recent Norfolk Southern train derailment in Ohio. Citizens' lived experiences of physical ailments did not align with the EPA's data collection efforts that found the environment safe (Fortin, 2023; Harrison, 2019; Jones, 2023).

We offer three recommendations for incorporating a historically informed approach to Superfund sites. First, practitioners should make concerted efforts to spend time and informally engage with the community in ways unrelated to Superfund. Deeply understanding and empathizing with others' perspectives requires building trust and relationships on an individual level (Leighninger, 2006; Metcalf et al., 2015; Sharp et al., 2013). Practitioners can attend community events, become regulars at coffee shops or other local establishments, and participate

in civic or volunteer organizations (Gil de Zúñiga et al., 2016; Hou & Kinoshita, 2007). In these taken for granted and mundane moments, lived experiences, values, and concerns become evident. Second, formal efforts to understand lived experiences require social science researchers. Practitioners should collaborate with local universities and scientists within their agency to conduct interviews, participant observation, or focus groups that will highlight concerns and insight beyond contamination (Maxwell & Kiessling, 2021). Third, practitioners should develop more robust Community Involvement Plans. The current CIP for Anaconda focuses on one-directional information sharing efforts and limited community interviews with those directly working with Superfund (EPA, 2022b). A more developed community profile with historical and cultural information, activities and opportunities for two-way dialogue between the community and practitioners, and interviews that encompass a broader swath of the community would not only include more people but improve the current approach. A historically informed approach that uses best practices will require an investment in time, resources, and training. Practitioners can utilize resources that do exist such as cultural trainings and social science technical reports from within the agency. We plan to share our work to support their ongoing cleanup efforts. Partnering with community members and researchers can inform a strategy that is more attuned to the community context and cultural norms.

Conclusion

Superfund sites across the United States pose threats to communities and ecosystems through contamination and pollution. The EPA engages with local communities through a variety of efforts and activities, though the focus is often on relaying or discussing technical information. This emphasis results in a partial understanding of communities through contamination and potential risks. We believe that engagement efforts during cleanups would be

more successful and better serve communities if they included a historically informed approach. We found, through lived experience, that community members' meanings and perceptions of contamination, risk, and operable units are far richer and more nuanced than the EPA's definitions and categories. Community members understood contamination and risk as only one piece of their life in the community. Contamination and risk had different meanings than contaminant levels and likelihood of exposure, but rather were trade-offs or accepted for the larger rewards of community connections and the perks of a company town. Space and landscape were understood as areas of adventure, recreation, childhood bliss, and collective memory rather than operable units. We believe that practitioners can enhance their community engagement efforts by developing more extensive Community Involvement Plans, collaborating with social science experts, and allocating time to become part of the community fabric.

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Chapter 5: Conclusion

This dissertation has examined the social dimensions in a post-industrial rural community with legacy pollution. The geographical focus has been Anaconda, Montana, a town with intersecting and overlapping identities, phases, and histories— a smelting operation, Superfund site, and an aspiring tourism and outdoor recreation destination. Post-industrial rural communities have been investigated through various lenses, among them— economic transitions, amenity migration, risk perceptions, political resentment, civic engagement, and cultural heritage. A theme among much of this previous work includes change, whether that be political, economic, social, environmental, or cultural. This work utilized the Anaconda Smelter Stack as a tying thread throughout the previous chapters to illustrate the role of the past in navigating social and economic transitions, developing futures for the community, and bolstering Superfund community engagement.

Drawing together insight from interdisciplinary scholarship, this work sought to better understand collective memory, not only identifying what memories are, but how they relate to and impact decision-making and planning processes. Chapter 2 provided context into the relationship between collective memory and community resilience. Through interviews, we found that collective memory impacts community resilience. Collective memory is not inherently good or bad, but instead functions differently throughout time, where it can act as a galvanizing force to mobilize and aid in recovery or as a constraint to change and innovative thinking. We identified similarities in how others have defined resilient (e.g., those who share an identity as survivors, connections to place, access to sufficient services) and less resilient (e.g., feeling stuck, lack of entrepreneurialism, tendency to look toward the past rather than the future) post-

industrial rural communities (Lazzeroni, 2019; Matarrita-Cascante & Trejos, 2013; Skeard, 2015; Sullivan et al., 2014).

Chapter 3 utilized a quantitative approach to develop measures for collective memory and future outlook to fill the gap between the past and future for communities navigating changes. Our hypothesized model established that the relationship between collective memory and future outlook is mediated by community resilience. Not only are these concepts linked, but it also emphasized the importance of perceptions of resilience. Communities can draw on collective memory and perceived resilience when designing plans and processes for their present and future.

Utilizing the stack as a springboard, Chapter 4 explored the lived experiences of community members through phenomenological interviews. Their stories characterized the interconnected nature of the smelter operation, community, and work life. These experiences transcended the technical manner in which Superfund sites are assessed and managed. We argued for an integration of a historical approach in Superfund community engagement. A historically informed approach based on lived experiences can alleviate tensions that arise between community identity and change as well as preservation and cleanup processes. We provided recommendations to support Superfund objectives through informal engagement, social science collaboration, and robust Community Involvement Plans.

Beyond the contributions of each individual chapter, this dissertation offers theoretical, methodological, and practical findings.

Theoretical Contributions

This research conceptually and empirically linked collective memory and community resilience in the context of post-industrial rural communities. Community resilience is seen as

necessary for communities so they can work together and implement strategies that contribute to their common objectives, wellbeing, social dynamics, and ability to navigate change (Aked et al., 2010; Imperiale & Vanclay, 2016; Sánchez-Zamora et al., 2014; Steiner & Atterton, 2015). Scholars working in post-industrial rural communities continue to investigate the factors that enable resilience, especially when it comes to understanding why some communities exhibit higher levels of resilience than others (Glass et al., 2022; Markantoni et al., 2019). From our interview findings and structural equation model, we have argued that collective memory plays a critical role in community resilience for these communities. However, contrary to other factors that are often listed as contributing to resilience such as leadership or community capacity, collective memory behaves with more complexity. Collective memory exists, in some form, in communities, so it is not the presence or absence of memories that impact resilience but the types of memories, whether they are positively or negatively directed, and their reach and strength. In some instances, it seems that collective memory not only influences community resilience but contributes to the factors that enable resilience in post-industrial rural communities, like belonging, social capital, community capacity, and ability to work together during difficult times (McManus et al., 2011; Messer et al., 2015; Puntscher et al., 2014; Schwarz et al., 2011; Steiner & Atterton, 2015). The various ways collective memory behaves further illustrates the need to consider that while there are multiple factors that enable community resilience broadly, they are context dependent and specific scenarios may require more of one factor than another (McAreavey, 2022; Wilson, 2014).

Our contributions to memory studies and futures research are threefold. First, many collective memory studies, especially those that utilize surveys, occur at the national or international scale (Abel et al., 2019; Öner et al., 2022; Schuman & Scott, 1989). Taking a

"bottom-up" approach in our investigation at the community scale enabled us to elicit collective memories through interviews, rather than relying on inferences drawn from documents or media (Bourdon & Kligler-Vilenchik, 2011; Connerton, 1989). The survey provided further validation of our findings among the broader population (Bourdon & Kligler-Vilenchik, 2011; Connerton, 1989). We have shown that transmission— when memories spread across a group— occurred at the community scale and converged around the stack (Hirst & Manier, 2008). In addition, memory scholars have called for more interdisciplinary collaboration (Hirst et al., 2018). They can utilize our and other post-industrial rural community research (Adams et al., 2018; Messer et al., 2015; Wheeler, 2014; Wråkberg, 2019) to better refine how collective memory works in community scales. Second, memory scholars in recent years, especially those in psychology, have acknowledged the need to connect collective memory and future thinking indicating a lack of emphasis and study of the future (Heux et al., 2022; Szpunar & Szpunar, 2016; Topuc & Hirst, 2022; Wertsch & Roediger, 2022). Often, collective memory research assumes a certain future will follow based on the past (Szpunar & Szpunar, 2016). This is not possible for most post-industrial rural communities, and we offer that there is a complex relationship between collective memory and future thinking. Third, we have advanced the growing field of futures research (Bengston, 2019). While futures research has considered how social, physical, ecological, and economic contexts influence the future, it has lacked deeper engagement with complex social dimensions, like the role of the past (Moore & Milkoreit, 2020; Thagard, 2014). Collective memory may limit or alter the source material available when imagining the future, which could strengthen or diminish the ability to design sustainable and collaborative future plans for communities experiencing changes (Moore & Milkoreit, 2020; Szpunar & Szpunar, 2016).

Methodological Contributions

This dissertation offers two methodological contributions: 1) quantitative measures of collective memory and future outlook and 2) a phenomenological approach to Superfund. Memory studies scholars have articulated the need to improve methodological practices and expand the methods used in the study of collective memory (Conway, 2010; Espinoza et al., 2014; Kansteiner, 2002). They have also advocated for techniques that extend beyond analyzing texts and public symbols to determine collective memories by directly engaging the population in question (Bourdon & Kligler-Vilenchik, 2011; Kligler-Vilenchik et al., 2014; Schwartz & Schuman, 2000). In addition, collective memory and futures have lacked quantitative measures. Surveys have determined salient collective memories through open-ended or multiple-choice responses but have not used replicable measures (Gordon & Glenn, 2009; Larson & Lizardo, 2007; Popper, 2008; Roediger et al., 2019; Schuman & Corning, 2000; Schuman & Scott, 1989). Through our mixed methods approach, we developed quantitative collective memory measures about the stack that arose from community interviews. These measures will be useful at community and national scales where further testing and refining can explore the history and identity dimensions that constitute collective memory and expand the ability to connect collective memory with other concepts. Futures research remains less prevalent in the academic literature than in business and military contexts, and quantitative future outlook measures provide an opportunity for testing that can bring unity across the discipline (Bengston, 2019; Hichert et al., 2021).

Phenomenological interviews enable methodological growth when assessing post-industrial rural communities. While there is abundant research on lived experiences and embodiment of risk, toxicity, and contamination (Kern, 2015; Shattuck, 2021; Shriver et al.,

2020; Sword-Daniels et al., 2018), phenomenological approaches are underutilized and often focus strictly on contamination rather than broader community experiences. Through phenomenological interviews, we uncovered stories about growing up and living in a smelting town, which highlighted strong attachment and fondness— a more comprehensive narrative than one only about contamination. A phenomenological approach can elicit perceptions of what is meaningful for communities in a way that is tied to their emotions and allows them to share their stories in an informal and conversational way. Natural resource management studies have utilized phenomenological approaches (Gruver et al., 2017; Jamison & Muth, 2022) to understand decision-making contexts. Phenomenological approaches can be further explored in land management and public processes involving emotional or sensitive issues.

Practical Implications

There are two important practical contributions of this body of research. First, the consideration and understanding of collective memory can assist post-industrial rural communities. Across the United States, these communities are facing slow burn and rapid changes, which will likely continue in the coming years (Sherman, 2021). As these communities create development plans, make decisions, develop policies, and think about their futures, collective memory can serve as a useful tool to garner understanding amongst community members about their own values and perceptions. It can offer insight into the complexity of industrial landscapes and the need for slow and thoughtful processes to address concerns (Messer et al., 2015; Beckett, 2021). Second, we have shown the need for historically informed community engagement in the Superfund process. Integrating lived experiences and culturally informed cleanups has the potential to improve future cleanups by fostering community buy in, trust, and relationship building (Maxwell & Kiessling, 2022). The EPA and many federal

agencies struggle to balance their technocratic roots with meaningful community engagement (De'Arman, 2020; Dudley et al., 2018). For Superfund sites, there are threats to public health and the environment that can challenge a shift from technical data and mandated engagement toward lived experiences and informal engagement, especially when, from an agency-wide level, the emphasis remains on technical over cultural trainings (Kiessling et al., 2021). However, without attention to these issues, agencies will jeopardize cleanup success and potentially, wider initiatives like environmental justice. While the EPA has adopted several environmental justice policies and hired environmental justice staff, there has been little regulatory reform (Harrison, 2019). This is emblematic of larger issues in the EPA and federal agencies such as resource constraints, political economic pressure, legal uncertainty for implementing reforms as well as cultural elements within the agency that see priorities and goals differently (Harrison, 2019). While broader agency change may be necessary, a focus on lived experiences indicates a step in the right direction.

Future Research Directions

We conclude by outlining future research directions. Throughout this research, it became clear that there is untapped potential in the concept of collective memory. In Anaconda and similar communities, older generations may share collective memories that differ from those of younger generations (Jelin, 2009; Stone et al., 2014). An area of further exploration includes how stable the collective memories of the stack are across time and if they remain the same for younger generations. Following Schuman and Scott's (1989) critical years hypothesis, where the events that people find the most important occur during their adolescence or early adulthood, subsequent research in Anaconda could investigate how the stack perpetuates collective memory for different generations that were not alive when the smelter operated. There is also an

opportunity to tease out the diverse and conflicting collective memories that exist in Anaconda around the stack (Conway, 2010).

Our study of collective memory at the community scale compared to previous research at larger scales implores further cross-scalar examination. Collective memory can be useful in larger national and global issues that require mobilization across scales like climate change or pandemics (Wertsch & Roediger, 2022). Further study of what the collective memories are and how they function across scales (Cordonnier et al. 2022) could provide insight and direction for these wicked problems. Collective memory as a cross-scale connection could also be of interest to those in natural resources who may investigate its role in social-ecological systems. Of relevance to the community scale and social-ecological systems is an exploration of contrasting or silenced collective memories, which can serve to design sustainable and environmentally just futures in a world with a rapidly changing climate (Perreault, 2018).

There is also an opportunity for further exploration of Superfund culture amongst EPA staff and practitioners and the implications for a historically informed approach to community engagement. In-depth work by Harrison (2019) highlighted the external and internal constraints of the agency to meaningfully implement and promote environmental justice. Many Superfund sites and other contaminated areas exist in marginalized and underserved communities (Burwell-Naney et al., 2013; Stretesky & Hogan, 1998). The ability for these communities to have input in the Superfund process not only strengthens decision making but meets environmental justice objectives (Harrison, 2019). Further research could assess the lived experiences and perceptions of both communities and practitioners in these situations.

Many post-industrial communities are looking toward their future as they design policies and plans after major economic, social, and environmental changes. We hope this research

illustrates the need to look back— not to get stuck in the past— but to honor and use it to build a better present and future. Collective memory can be a useful tool for communities to illuminate and examine their histories and guide them toward desirable futures.

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Appendix A: Semi-Structured Interview Guide

Can you just tell me a little about yourself, how long you've lived in Anaconda, your job position, or what do you do in your job?

I want to start with the story of Anaconda. I know Anaconda has a rich and interesting history.

- What do you think people are the most proud of when it comes to this community?
    - [Probe] Do you see it as a part of or separate from nearby communities like Deer Lodge or Butte?
    - [Probe] What makes someone an Anacondan?
- When people come here from other places, what do you think is drawing them here?
    - [Probe] What kind of efforts do you think are being made to attract new residents or tourists?

I now want to talk about your sense of nostalgia and symbolism in the community.

- What do you think the stack means/represents to people?
- What other sites or areas do you think are meaningful for members of this community?

I am really interested in learning more about this community.

- What kinds of things bring people together?
- In your opinion, what are some things this community struggles with?
    - [Probe] This could be struggles related to economic, environmental, housing issues, or retaining residents/young folks
- Can you tell me about the environmental issues in the community?
    - [Probe] Which environmental issues are especially important to community members?
    - [Probe] Do you see people coming together around these or other environmental issues? Do they go to meetings, form groups, or give feedback?
    - [Probe] Do you see a relationship between the environmental issues and the other issues?
- In what ways are you involved either personally or through your work with these issues?
- I'm also curious, thinking about the recent coronavirus pandemic, if this has affected how you think about environmental issues or other issues in the community at all?

Now I want to specifically discuss water quality and soil quality issues in your community.

- Are there specific water or soil issues that you think this community is concerned about?
- How do you see people addressing these issues?
    - [Probe] Is there anything that makes it especially complicated to resolve these issues, like flooding or wind?
- Who do you think is most at risk or suffers because of these issues?
- Whose responsibility is it to clean up these water/soil issues?
    - [Probe] Do you trust them to do it?

- Who do you think actually has the capacity to make changes/get this work done?
    - [Probe] In a perfect world, how would you like to see this get done?

I want to talk a little bit about process.

- I'm wondering about the Superfund process, what do you think the major milestones or turning points were?
    - [Probe] Were there times when you were more or less excited about the Superfund process? Hopeful? Discouraged?
    - [Probe] For EPA/other officials, do you think this process is effective?
    - [Probe] For EPA/other officials, are there agencies that should or shouldn't be involved in the process?
- For you personally, was there a moment when you noticed a change in the community?
- I'm still trying to put it all together, it seems to me that some of the players are DEQ, EPA, ARCO, and the county all play a role. Am I missing anybody?
- Of these groups, who do you feel like is getting information out to people?
    - [Probe] Who do you trust most in the process to get information?
- How hard or easy has it been to generate or sustain interest from the broader community in this process?
    - [Probe] For EPA/other officials, are there particular strategies you use to get the public involved or that you have seen work well in this community?
    - [Probe] For EPA/other officials, (if they say they lead meetings) Did you receive any training to run these meetings and respond to community members?
    - [Probe] For EPA/other officials, do you think the communication to the public is sufficient?
- Can you tell me a bit about how the Superfund money is allocated?
    - [Probe] Do you know how much of that goes to communication and outreach in the community?
    - [Probe] Do you think the money should be allocated differently?

I have just a few more questions on how this process has affected you and your community.

- Do you feel like people understand their role and feel they have a voice in these Superfund issues?
- Thinking about Anaconda and all the other communities in the Upper Clark Fork, have some benefitted more than others in the Superfund process?
    - [Probe] Do you think some communities have been left out?
    - [Probe] Do you think this process has been fair?
- Circling back to some of the earlier issues we talked about, do you think this community has the resources it needs to address these issues?
- To you, what does a thriving Anaconda community look like?
    - [Probe] Are there other parts to the story of Anaconda that deserve more attention?

- Is there anything else you would like to share with me that I didn't ask about?

Appendix B: Non-Response Bias Results

Table A.1. Difference between design weighted and final nonresponse weighted means

Variable	Mean Difference μDWT- μFNLWT	Significance at 95% CI
Q7_1	0.14	No
Q7_2	0.13	No
Q8_1	0.17	No
Q8_2	0.17	No
Q9_1	0.11	No
Q9_2	0.05	No
Q9_3	0.04	No
Q12_1	0.17	No
Q12_2	0.14	No
Q12_3	0.05	No
Q12_6	0.06	No
Q12_7	0	No
JRWS_1	0.09	No
JRWS_2	0.04	No
JRWS_3	0.02	No
JRWS_6	0	No
JRWS_7	0	No
Q14_1	0.03	No
Q14_4	0.01	No
Q14_5	0.05	No
Q14_7	0.01	No
Q15_1	0.08	No
Q15_3	0.1	No
Q15_4	0.1	No
Q15_6	0.07	No
Q20_1	-0.09	No
Q20_2	0.07	No
Q20_9	0.05	No
Q20_11	0.03	No
Q21_1	0.01	No
Q21_2	0.13	No
Q21_4	0.05	No

Table A.2. Relationship between answers to 33 survey questions and response propensity

Survey Question	Parameter Estimates			Model Effects Significance	
		Response Propensity			
	Anaconda	Low	High	Survey	Response Propensity
Q7_1	1.415	-0.045	.000	.000	0.785
Q7_2	0.809	0.063	.000	< .001	0.701
Q8_1	0.826	-0.291	.000	< .001	0.062
Q8_2	0.690	-0.184	.000	< .001	0.260
Q9_1	0.849	0.088	.000	< .001	0.594
Q9_2	1.120	0.122	.000	< .001	0.443
Q9_3	0.824	-0.102	.000	< .001	0.531
Q12_1	0.065	0.210	.000	0.629	0.133
Q12_2	0.081	0.083	.000	0.561	0.603
Q12_3	0.214	-0.001	.000	0.059	0.997
Q12_6	0.126	-0.127	.000	0.274	0.456
Q12_7	0.096	0.011	.000	0.432	0.941
jrws_1	NA	0.077	.000	NA	0.788
JRWS_2	NA	-0.144	.000	NA	0.606
JRWS_3	NA	0.216	.000	NA	0.446
JRWS_6	NA	0.040	.000	NA	0.892
JRWS_7	NA	0.154	.000	NA	0.634
Q14_1	0.230	-0.010	.000	0.040	0.945
Q14_4	0.237	0.004	.000	0.159	0.977
Q14_5	0.303	-0.137	.000	0.037	0.332
Q14_7	0.192	-0.001	.000	0.225	0.996
Q15_1	0.118	-0.068	.000	0.186	0.655
Q15_3	0.104	-0.117	.000	0.648	0.417
Q15_4	0.011	-0.222	.000	0.924	0.128
Q15_6	0.129	-0.042	.000	0.223	0.760
Q20_1	0.371	0.036	.000	0.006	0.814
Q20_2	0.078	0.001	.000	0.715	0.993
Q20_9	0.235	-0.306	.000	0.055	0.038
Q20_11	0.204	0.083	.000	0.189	0.483
Q21_1	0.051	-0.040	.000	0.808	0.791
Q21_2	0.175	0.079	.000	0.288	0.622
Q21_4	0.479	-0.262	.000	< .001	0.093

2021

Upper Clark Fork River Watershed Survey

Photo: Discover Anaconda

START HERE ➡

Q1. Are you the adult age 18 or older in your household who will have the NEXT birthday? Mark one button (X)

- O Yes → Please continue.
- O No → Please have the adult in your household who will have the next birthday complete the survey.

Administered by: University of Montana Bureau of Business and Economic Research
Sponsored by: Consortium for Research on Environmental Water Systems
12/1/2021

UNIVERSITY OF MONTANA

COMMUNITY INVOLVEMENT

First, we would like to understand your relationship to your community. By "community," we are referring to the city or town where you live or live near.

Q2. How many years have you lived in your community?

_____ (years)

Q3. How many generations has your family lived in this community? Please mark one button (X).

- **O** One or less (I was born here or I moved here)
- **O** Two (my parents were born here)
- **O** Three (my grandparents were born here)
- **O** Four (my great grandparents were born here)
- **O** Five or more (my great-great grandparents were born here, or more)
- **O** Time immemorial (my entire ancestral lineage is from here)

Q4a. In a typical year, how many times per month do you participate in civic organization (e.g. Elks Lodge, Rotary Club, Little League) events or activities? Please mark one button (X).

- **O** I typically do not participate
- **O** Less than once per month
- **O** Once
- **O** 2-3
- **O** 4 or more

Q4b. If you participate in civic organizations, please list which civic organization events or activities.

_____

_____

Q5a. In a typical year, how many times per month do you participate in volunteer events or activities? Please mark one button (X).

- **O** I typically do not participate
- **O** Less than once per month
- **O** Once
- **O** 2-3
- **O** 4 or more

Q5b. If you participate in volunteer events activities, please list which volunteer events activities.

_____

_____

Q6. On a scale of zero to ten, how socially connected do you feel in your community? Please circle one number.

Not at all connected					Somewhat connected					Extremely connected
0	1	2	3	4	5	6	7	8	9	10

WATER

Q7. Now, we would like to know more about water resources in your community. In general, how would you rate the water QUALITY in your community right now for the following categories? Please mark one button (X) for each item listed below.

	Very poor 1	Poor 2	Acceptable 3	Good 4	Very good 5
a. Household drinking water.	O	O	O	O	O
b. Groundwater (includes aquifers, well water).	O	O	O	O	O
c. Water I use for recreation in this community (e.g. fishing, boating, swimming, etc.).	O	O	O	O	O

Q8. In general, how would you rate water QUANTITY in your community right now for the following categories? Please mark one button (X) for each item listed below.

	Not enough 1	Slightly less than enough 2	Enough 3	Slightly more than enough 4	More than enough 5
a. Household drinking water.	O	O	O	O	O
b. Groundwater (includes aquifers, well water).	O	O	O	O	O
c. Water I use for recreation in this community (e.g. fishing, boating, swimming, etc.).	O	O	O	O	O

Q9. Now we would like you to think about all the water resources in your community, including drinking water, rivers and streams, lakes, groundwater, etc. For each of the following statements about WATER IN YOUR COMMUNITY, please rate your level of agreement. Please mark one button (X) for each item listed below.

	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
a. Overall, I'd describe the water in my area as clean.	O	O	O	O	O
b. I am satisfied with the quality of the water in my community.	O	O	O	O	O
c. I am satisfied with the amount of water available for my community's needs.	O	O	O	O	O

SUPERFUND PROCESS

Next, we would like to know more about your perspective on the overall success of the Superfund cleanup. By "Superfund cleanup," we are referring to the cleanup in your community that includes rivers and tributaries, soil, and industrial sites.

Q10. Have you attended any meetings or information sessions about the Superfund cleanup in your community? Please mark one button (X).

O Yes

O No

Q11. Please indicate how much you agree or disagree with the following statements about the Superfund <u>cleanup</u> in your community. Please mark one button (X) for each item listed below.

	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
a. Overall, I would describe the Superfund cleanup as a success.	O	O	O	O	O
b. I am satisfied with the Superfund cleanup as a whole.	O	O	O	O	O
c. The outcomes from the Superfund cleanup do NOT meet my expectations.	O	O	O	O	O

Q12. Please indicate how much you agree or disagree with the following statements about the Superfund <u>process</u> in your community. Please mark one button (X) for each item listed below.

	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
a. I had sufficient opportunity to comment on the Superfund process.	O	O	O	O	O
b. There were ample opportunities for public input.	O	O	O	O	O
c. The local community was involved in the decision-making process.	O	O	O	O	O
d. There was sufficient advertising about meetings.	O	O	O	O	O
e. I had enough information ahead of time to weigh in on the process.	O	O	O	O	O
f. I was able to participate in decisions about the Superfund process.	O	O	O	O	O
g. Public comments were seriously considered.	O	O	O	O	O
h. Minds were made up before the public had a chance to comment.	O	O	O	O	O
i. Public comment felt meaningless.	O	O	O	O	O
j. Final decisions balanced the concerns of all people.	O	O	O	O	O

PERSPECTIVES ON AGENCIES AND GOVERNMENT

We would like to know about your perspectives on different entities that play a part in managing environmental resources in your community.

Q13. First, we would like to know about your perspectives on the FEDERAL ENVIRONMENTAL PROTECTION AGENCY (EPA). Please indicate how much you agree or disagree with the following statements about the EPA. Please mark one button (X) for each item.

The EPA…	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
a. …cares about people like me.	O	O	O	O	O
b. …is concerned about the effects that its decisions have on people like me.	O	O	O	O	O
c. …cares about the concerns that are important to me.	O	O	O	O	O
d. …listens to the public.	O	O	O	O	O
e. …allows the public to have some influence over the outcomes of decisions that are made.	O	O	O	O	O
f. …communicates information (e.g. news, updates, decisions) to the public in a timely manner.	O	O	O	O	O
g. …is truthful with the public.	O	O	O	O	O
h. …efficiently spends money.	O	O	O	O	O
i. …is generally competent.	O	O	O	O	O

Q14. Now, we would like to know about your perspectives on the MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ). Please indicate how much you agree or disagree with the following statements about the DEQ. Please mark one button (X) for each item listed below.

The DEQ…	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
a. …cares about people like me.	O	O	O	O	O
b. …is concerned about the effects that its decisions have on people like me.	O	O	O	O	O
c. …cares about the concerns that are important to me.	O	O	O	O	O
d. …listens to the public.	O	O	O	O	O
e. …allows the public to have some influence over the outcomes of decisions that are made.	O	O	O	O	O
f. …communicates information (e.g. news, updates, decisions) to the public in a timely manner.	O	O	O	O	O
g. …is truthful to the public.	O	O	O	O	O
h. …efficiently spends money.	O	O	O	O	O
i. …is generally competent.	O	O	O	O	O

Q15. Lastly, we would like to know about your perspectives on the LOCAL GOVERNMENT. Please indicate how much you agree or disagree with the following statements about local government. Please mark one button (X) for each item listed below.

The local government…	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
a. …cares about people like me.	O	O	O	O	O
b. …is concerned about the effects that its decisions have on people like me.	O	O	O	O	O
c. …cares about the concerns that are important to me.	O	O	O	O	O
d. …listens to the public.	O	O	O	O	O
e. …allows the public to have some influence over the outcomes of decisions that are made.	O	O	O	O	O
f. …communicates information (e.g. news, updates, decisions) to the public in a timely manner.	O	O	O	O	O
g. …is truthful to the public.	O	O	O	O	O
h. …efficiently spends money.	O	O	O	O	O
i. …is generally competent.	O	O	O	O	O

COMMUNITY HERITAGE

Now, we would like to know about your perspectives on your community's heritage and places that are important to you.

Q16. In your opinion, please list the three most important events in the history of your community in the last 100 years.

a._____

b._____

c._____

Q17. In your opinion, please list the three most important places (parks, buildings, gathering spots, etc.) in your community.

a._____

b._____

c._____

Q18. We are also interested in learning more about the smelter stack in Anaconda. Please indicate how much you agree or disagree with the following statements about the smelter stack. Please mark one button (X) for each item listed below.

	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
a. We are proud to have the stack.	O	O	O	O	O
b. It is common knowledge that the stack is important to my community.	O	O	O	O	O
c. The stack is part of the community's identity.	O	O	O	O	O
d. Most community members find the stack important.	O	O	O	O	O
e. Community members disagree about the meaning of the stack.	O	O	O	O	O
f. The community is emotionally attached to the stack.	O	O	O	O	O
g. Protecting the stack is key to promoting our community identity moving forward.	O	O	O	O	O
h. The stack keeps the community from moving on.	O	O	O	O	O

Q19. We also like to know more about the community identity of Anaconda. Please indicate how much you agree or disagree with the following statements about community identity. Please mark one button (X) for each item listed below.

	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
a. I feel connected to the mining and smelting heritage of Anaconda.	O	O	O	O	O
b. It is important to remain connected to the mining and smelting heritage of the past.	O	O	O	O	O
c. The lifestyle during the smelting era shaped the current character of Anaconda.	O	O	O	O	O
d. The stack is part of my identity.	O	O	O	O	O

COMMUNITY OUTLOOK

Next, we would like to know about your feelings about your community in general. By "community," we are referring to the city or town where you live or live near.

Q20. For each of the following statements about your community, please indicate your level of agreement or disagreement. Please mark one button (X) for each item listed below.

	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
a. The physical environment in my community negatively affects my health.	O	O	O	O	O
b. People in my community help out one another.	O	O	O	O	O
c. Residents in my community feel isolated from other parts of the state.	O	O	O	O	O
d. The people in my community are open to new ideas.	O	O	O	O	O
e. People who live in my community have similar values or ideas.	O	O	O	O	O
f. There is a sense of pride among people in my community.	O	O	O	O	O
g. Leaders in my community listen to residents.	O	O	O	O	O
h. My community has strong community leadership.	O	O	O	O	O
i. The changes in my community are positive.	O	O	O	O	O
j. When a problem occurs, community members are able to deal with it.	O	O	O	O	O
k. Residents of my community participate in community events.	O	O	O	O	O

Q21. For each of the following statements about YOUR COMMUNITY'S FUTURE, please indicate your level of agreement or disagreement. Please mark one button (X) for each item listed below.

	Strongly disagree 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Strongly agree 5
a. This community gives me plenty of resources in planning for the future.	O	O	O	O	O
b. I do not feel limited by the options that are available here.	O	O	O	O	O
c. Overall, this community is headed in the right direction.	O	O	O	O	O
d. I feel hopeful about my community's prospects for the future.	O	O	O	O	O

Q22. Now, we would like to ask about economic development options in YOUR COMMUNITY'S FUTURE. Please indicate how acceptable each of the following visions for the future of your community are to you. Please mark one button (X) for each item listed below.

	Not at all unacceptable 1	Somewhat unacceptable 2	Neutral 3	Somewhat acceptable 4	Perfectly acceptable 5
a. A tourism town based on outdoor recreation.	O	O	O	O	O
b. A tourism town based on mining heritage.	O	O	O	O	O
c. A technology hub (high tech industry with offices).	O	O	O	O	O
d. A town with a thriving main street.	O	O	O	O	O
e. A service hub (hospitals, equipment for purchase, shopping).	O	O	O	O	O
f. A town with infrastructure that supports remote workers.	O	O	O	O	O
g. An industrial hub (manufacturing centers, mining).	O	O	O	O	O

Q23. Do you think the following visions for the future are likely to happen? Please mark one button (X) for each item listed below.

	Yes	No
a. A tourism town based on outdoor recreation.	O	O
b. A tourism town based on mining heritage.	O	O
c. A technology hub (high tech industry with offices).	O	O
d. A town with a thriving main street.	O	O
e. A service hub (hospitals, equipment for purchase, shopping).	O	O
f. A town with infrastructure that supports remote workers.	O	O
g. An industrial hub (manufacturing centers, mining).	O	O

Q24. When you think about your community's future, how many years are you generally considering? Please mark one button (X).

- **O** 1-5
- **O** 6-10
- **O** 11-20
- **O** 21-30
- **O** 31-50
- **O** 51+

DEMOGRAPHIC INFORMATION

Q25. In what year were you born? Please print the year in the box below.

Year | | | | |

Q26a. How many people live in your household? Please print the number in the box below.

Number of people | |

Q26b. Please list the ages of the people in your household:

_____

Q27. What is your gender? Please mark one button (X) below.

- O Male
- O Female
- O Self-describe _____

Q28. What is the highest level of education you have completed? Please mark one button (X)

- O No schooling completed
- O Less than 12th grade
- O High school graduate (includes GED, HiSET)
- O Some college, no degree
- O 2-year college degree (associate's, technical, etc.)
- O 4-year college degree (bachelor's)
- O Graduate or professional degree (master's, PhD, MBA, etc.)

Q29a. What kind of business or industry is your main job in? Briefly describe below. If currently unemployed check the box below.

☐ Currently unemployed

_____ Type of organization I work for

Q29b. What kind of work do you usually do in your main job? Briefly describe below.

_____ Kind of work I do

Q30. Which of the following best represents your political views? Please mark one button (X)

- O Very conservative
- O Somewhat conservative
- O Moderate
- O Somewhat liberal
- O Very liberal
- O Prefer not to say

Q31. On a scale of zero to ten, how much has the COVID-19 pandemic impacted your connection to your local community? Please circle one number.

Not at all impacted					Somewhat impacted					Extremely impacted
0	1	2	3	4	5	6	7	8	9	10

Q32. Of the options listed below, what best describes your financial situation? Please mark one button (X)

- O My household struggles to cover monthly expenses
- O My household has enough to cover monthly expenses
- O My household has more than enough to cover monthly expenses

Q33. We are looking forward to sharing the results from this survey with your community. We want to assure you that all responses will remain confidential. How would you most like to learn about these results? Please let us know below.

_____

_____

_____

_____

_____

_____

_____

Thank you for your help with this important research!

BUREAU OF BUSINESS AND ECONOMIC RESEARCH
UNIVERSITY OF MONTANA

Upper Clark Fork Watershed Survey

Use stamped envelope provided or mail to:

Bureau of Business and Economic Research

Gallagher Business Building, Rm. 231

University of Montana

21 Campus Drive

Missoula, MT 59812-6840

Appendix D: Phenomenological and Semi-Structured Interview Guide

Guiding Phenomenological Question

As a long-term member of this community, can you tell me a story that stands out to you when you were aware of the stack?

- [Probe] Could you tell me a story of a time when the stack was part of your experience of your community or your family?

Semi-Structured Questions

Demographics

- How long have you lived in the community?
    - [Probe] Did your parents grow up here?
    - [Probe] What brought your family to Anaconda?
- What do you (or did you do) for work?
- Do you have children that live in the community?

Collective Memory

- Is the stack a symbol of your community?
- Are there other memories or stories you have of the stack that are important that we haven't talked about?
- What emotions come up when you look at the stack?
- You told me about the community experience of the stack, how important is the stack to you? OR, You told me about your individual experience of the stack, what do you perceive as the importance of the stack to the community?

Identity

- How does the stack relate to your identity?
- How is your identity related to the stack similar or different from the community's identity related to the stack?

Change

- How has this community experienced change in the past 40+ years?
    - [Probe] How have you experienced change?
- How has the meaning of the stack changed over time?
    - [Probe] How was the stack viewed in the past compared to the present?