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**Through Fire and Water: Protecting Museum Collections
Against Increasing Climate Change Risks**

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Master's Project Primary Adviser: Gregory Stevens, M.A.T.

**Submitted in partial fulfillment of the requirements
for the Master of Arts in Museum Professions
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SETON HALL UNIVERSITY
COLLEGE OF COMMUNICATION AND THE ARTS
GRADUATE STUDIES

APPROVAL FOR SUCCESSFUL PRESENTATION

Master's Candidate, Elyse Gombas, has successfully presented and made the required modifications to the text of the master's project for the Master of Arts degree during this Spring Semester 2021.

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Abstract

As stewards of cultural heritage, museums have the responsibility to protect their collections from increasing climate change risks. Literature revealed that though cultural heritage sites are threatened by climate change, museums lack sufficient climate change adaptation strategies. In response, this study examined how museums can create effective climate change adaptation strategies. Through a qualitative comparative case study of the Getty Center and Newark Museum of Art and content and textual analyses, the study identified key themes of institutional mission, values, and policies, research, education and training, physical prevention, and collaboration as requirements for successful adaptation. Informed by these themes, a series of recommendations for the creation and implementation of climate change adaptation strategies are presented.

Keywords: climate change, museum collections care, disaster preparedness, case study, textual analysis, content analysis

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Chapter 1:

Statement of the Problem

Introduction

Since their creation, museums have been regarded as guardians of both tangible and intangible heritage (Alexander et al., 2017). Museums protect objects against agents of deterioration, such as fire, water, pests, and theft, using a variety of methods including disaster preparedness and emergency response plans and preventive care (Bauer Kilgo, 2020). This stewardship of collections, which entails the highest public trust, is a fundamental aspect of a museum's ethical purpose (AAM, 2000; ICOM, 2017). While the museum's role as stewards of cultural heritage remains essential to its mission, museums have evolved from collections-based institutions to ones that are dedicated to meeting the needs of and addressing subjects important to visitors (Alexander et al., 2017; Marstine, 2011; Sutton, 2020;). A current issue which museums must address and that threatens both tangible museum collections and the well-being of the public is climate change and the increased risks it causes.

The International Panel on Climate Change (IPCC) (2014a, b) concluded in its *Fifth Assessment Report* (AR5), that human influence on the climate system is clear and growing. The IPCC (2014a) defines *climate change* as “a change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer” (p. 5). As the authoritative source on climate change research, the IPCC's AR5 (2014a, b) is supported by other reputable organizations such as the World Meteorological Organization (WMO), the U.S. Global Change Research Program (USGCRP), and the Center for Climate and Energy Solutions (C2ES). These organizations agree that human activities, specifically greenhouse gas emissions, are the primary cause of climate change (C2ES, 2019; IPCC, 2014a, b; USGCRP, 2017; WMO, 2020). In its *Statement on the*

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State of the Global Climate in 2019 (2020), the WMO predicts that greenhouse gas levels will continue to rise and found that the past five years, 2015-2019, were the warmest on record. If anthropogenic greenhouse gas emissions continue, there will be an increased likelihood of severe and irreversible impacts on humans and ecosystems (IPCC, 2014b).

Climate change impacts both natural and human systems (C2ES, 2019; IPCC, 2014a). Climate and physical scientists who studied climate change found that it causes increased extreme precipitation and weather events (heat waves, droughts, floods, cyclones, and wildfires); rising ocean temperatures; melting glaciers; ocean acidification; and rising sea levels (IPCC, 2014a, b; USGCRP, 2017). These physical risks will negatively impact human populations (IPCC, 2014a, b; WMO, 2020). Effects of climate change lead to the breakdown of infrastructure networks, the loss of livelihoods, food and water supplies, and illness and death (IPCC, 2014b; WMO, 2020). Climate change effects every continent, but risks are unevenly distributed and are greater for disadvantaged communities (IPCC, 2014b). The effects of climate change will persist for centuries and will continue to cause long-term changes, but impacts can be reduced through the implementation of adaptation and mitigation strategies at all levels of society, across all sectors (C2ES, 2019; IPCC, 2014a, b).

Museums and other cultural heritage sites are not exempt from climate change threats. The increased frequency and intensity of rainfall, flooding, wildfires, and temperature fluctuations caused by climate change directly harm museum buildings, monuments, and archaeological sites (Cassar, 2005; Markham et al., 2016;). Sea-level rise is a major threat to the many museums and heritage sites located along coastlines (Cassar 2005; Heathcote et al., 2017; Markham et al., 2016). Extreme weather events and temperature fluctuations ultimately create an environment that is unsuitable for artifacts (Coehlo et al., 2020; Huijbregts et al., 2012; Leissner

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et al., 2015). The physical damage caused by climate change will also adversely affect *intangible heritage*, the immaterial aspects of culture, associated with museum objects (Brabec & Chilton, 2015; Jigyasu et al., 2013; Markham et al., 2016). As communities are displaced and tangible heritage is destroyed by climate change disasters, cultural traditions and practices will be permanently lost (Adger et al., 2012; Brabec & Chilton, 2015). The destruction of cultural heritage leads to the loss of important social and economic values that contribute to community well-being.

As the impacts of climate change become more prevalent, more museums are recognizing the importance of adapting to climate change threats. For example, both the Whitney Museum of American Art and the Getty Center have adapted their buildings and facilities to better withstand floods and wildfires respectively (Cascone, 2019; Flynn, 2020). However, as more research is conducted on the intersection of climate change adaptation and cultural heritage, several barriers to adaptation have been identified. In their study on climate adaptation, Fatorić & Seekamp (2017), surveyed historic preservation and cultural resource management experts in the southeastern U.S. and found that the greatest barriers to adaptation are: *institutional*, which occur when there are limited legislative instruments or an absence of policies and guidelines; *technical*, which relate to inefficient or lack of technical skills and limited procedures for gathering data; *financial*, which relate to lack of funding, limited access to financial resources and limited financial willingness; and *social*, which pertain to perceptions, values, and norms found within society. The authors note that barriers are interdependent of each other and barriers from different categories can coexist and reinforce each other (Fatorić & Seekamp, 2017). As climate change risks increase, museums and cultural heritage sites must work to overcome these barriers

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at the local, national, and international levels through participation, collaboration, and awareness (Cassar, 2005; Fatorić & Seekamp, 2017; Sesana et al., 2018).

Operating in service to the public, museums have an ethical responsibility to protect and care for the collections entrusted to them as outlined in the codes of ethics from the International Council of Museum (ICOM) (2017) and the American Association of Museum (AAM) (2000), which is now known as the American Alliance of Museums. A code of ethics holds museums accountable and establishes a foundation of mutual trust (Edson, 1997). A *code of ethics* defines appropriate actions and serves as a guide for the institution while *museum ethics* define the principles that underlie those actions (Edson, 1997). The central values of museum ethics as identified by Edson (1997) are caring, honesty, accountability, excellence, loyalty, respect for others, and responsible citizenship. These values relate to a museum's relationship with and obligation to objects and people (Edson, 1997). As museums evolved from collections-based to service-oriented, socially aware, and activist institutions, Marstine (2011) translates Edson's ideas into the 21st century. Marstine (2011) argues that *new museum ethics* concern the capacity of institutions to create social change and are contingent upon the relationship with their communities. The key values of new museum ethics are radical transparency, social responsibility, and guardianship of heritage (Marstine, 2011). These aspects of museum ethics theory reflect modern museums' roles as active agents within and influencers of society (Marstine, 2011).

Climate change is a complex issue with scientific, political, social, and economic dimensions, but above all, it is an ethical issue because all of society, including museums, are complicit (Janes, 2020). Museums have an opportunity to shape an informed, cooperative, and collaborative climate response that serves more people in more communities around the world

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and to become resources and allies to the private and public agencies looking for solutions to human health and wellbeing (Sutton, 2020). Despite this potential, museums have not made climate action a priority, remaining passive and neutral (Janes, 2020, 2015; Sutton, 2020). By not responding to climate change as a social justice issue, museums are not adhering to the ethical values of transparency and social responsibility outlined by Marstine (2011).

Additionally, by neglecting to address climate change and the physical threats it poses, museums are putting their collections at risk, therefore disregarding their ethical duty to protect, secure, care for, and preserve collections in the public trust (AAM, 2000; ICOM, 2017). Considering their duty to the public and the collections they care for, it is critical that museums acknowledge and respond to climate change as a global threat.

Purpose of the Study

While museums plan and prepare for emergencies using established policies and procedures, such as disaster preparedness and emergency response plans, many do not consider the short- and long-term effects caused by climate change. To better protect their collections against increasing threats and to perform their ethical duty, museums must implement climate change adaptation and mitigation strategies. Therefore, this research project was guided by the question:

RQ: How can museums create disaster risk management and climate change adaptation strategies to better protect collections against increasing climate change risks?

By investigating this question, this project sought to provide an understanding of how climate change affects collection care and identify ways in which museum professionals can mitigate climate change risks.

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A qualitative multiple case study was conducted using two art museums: the Getty Center in Los Angeles, California and the Newark Museum of Art in Newark, New Jersey. In addition, a textual and content analysis of professional, scholarly, and popular press literature was performed. The data's findings informed a series of recommendations that provide museum professionals with best practices and strategies for the implementation of climate change adaptation policies and procedures. Ultimately, this research project seeks to fill the gap in scholarly literature by contributing research that focuses on the relationship between climate change and museum collections care and to present replicable and sustainable adaptation strategies that ensure the continued protections and preservation of museum collections and the cultural, social, and economic benefits they provide for future generations.

Summary

This chapter introduced the need for museums to implement climate change adaptation strategies in response to increasing climate change risks. Chapter 2 provides a review of scholarly literature on climate change and cultural heritage and related themes including museum collections care, risk, and climate change adaptation. Next, Chapter 3 includes a description and rationale for the research project's qualitative comparative case study, textual, and content analyses. Chapter 4 then presents the project's findings and thematic interpretations. Finally, Chapter 5 offers a series of recommendation based on the project's findings and scholarly literature. The recommendations seek to provide museum professionals with the best practices for protecting and preserving their collections against climate change risks to ensure their continued use for future generations.

Chapter 2:

Literature Review

Introduction

To learn about the relationship between museums and climate change, a review of scholarly literature was conducted to understand of the impacts of climate change on museums and what measures are being taken to mitigate these impacts. The Seton Hall University online library databases were used to locate peer-reviewed, scholarly journal articles on climate change risks and cultural heritage, risk management, and climate change adaptation. Professional museum and cultural heritage literature were consulted to explore the methods, processes, and policies that can help in reducing climate change risks. Publications by non-governmental organizations were also used to examine the intersection of climate change and cultural heritage research occurring at the international level.

The literature review first introduces and defines cultural heritage and presents the impacts of climate change on tangible and intangible cultural heritage. It then examines the social and economic values cultural heritage offers to communities. The subsequent section focuses on preventive conservation and disaster preparedness and emergency response plans as tools used by museums to protect their collections from risks. Next, the chapter reviews the concept of disaster risk management in relation to climate change, cultural heritage, and museums. The literature review concludes with a discussion of the literature on climate change adaptation and an examination of the importance of adaptation strategies for the continued preservation of cultural heritage.

Through the literature review process, a gap regarding the impacts of climate change on museum collections was identified. Much of the literature focused on climate change and cultural heritage, and while museum collections can be considered cultural heritage, there were few

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articles and publications that addressed the effects of climate change on museums specifically. In response to these gaps the following research question was created:

RQ: How can museums create disaster risk management and climate change adaptation strategies to better protect collections against increasing climate change risks?

The following sections examine the scholarly literature that was used to develop this research question.

Climate Change and Cultural Heritage

The International Panel on Climate Change (IPCC) (2014b) concluded in its *Fifth Assessment Report* (AR5) that climate change is a threat to culture, with cultural heritage being an important aspect of culture. In 1972, the United Nations Educational, Scientific and Cultural Organization (UNESCO) separated *cultural heritage* into two categories: tangible and intangible cultural heritage. *Tangible cultural heritage* includes movable cultural heritage (e.g. paintings, sculptures, coins, manuscripts), immovable cultural heritage (e.g. monuments, archaeological sites), and underwater cultural heritage (e.g. shipwrecks, underwater ruins and cities) (UNESCO, 1972). *Intangible cultural heritage* includes customs, rituals, ceremonies, oral traditions, and performing arts (UNESCO, n.d.). Tangible objects and buildings only have meaning because of the intangible values cultures place on them, and in turn, intangible heritage is expressed through tangible objects (Brabec & Chilton, 2015). Because tangible and intangible cultural heritage are intertwined, climate change will affect both.

Several reports and studies discuss the detrimental physical impacts climate change disasters will have on cultural heritage (Cassar, 2009; Jigyasu, 2020; Jigyasu et al., 2013; Mínguez García, 2020; O'Brien et al., 2015; Phillips, 2014; Sabbioni et al., 2010; Sesana et al.,

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2018) Historic buildings, monuments, and archaeological sites are vulnerable to extreme rainfall, coastal erosion, flooding, temperature fluctuations, and changes in soil moisture (Cassar, 2005; Markham et al., 2016). Of these various risks, sea level rise has been identified by researchers as a major risk (Cassar 2005; Heathcote et al., 2017; Markham et al., 2016). A 2014 study by the University of Innsbruck and the Potsdam Institute for Climate Impact Research identified that more than 130 cultural World Heritage sites are at long-term risk from sea-level rise (Markham et al., 2016). Another climate change risk that is commonly studied in relation to tangible cultural heritage is changes in temperature and humidity (Coelho et al., 2020; Huijbregts et al., 2012; Leissner et al., 2015; Muñoz González et al., 2020). Extreme weather and temperature fluctuations caused by climate change lead to deterioration of building facades and archaeological sites (Cassar, 2005; Coelho et al., 2020; Leissner et al., 2015). These fluctuations also create unsuitable climate conditions for artifacts stored indoors, leading to damage of the objects. (Coehlo et al., 2020; Huijbregts et al., 2012; Leissner et al., 2015; Muñoz González et al., 2020). Without mitigation and adaptation to the physical risks of climate change, valuable tangible cultural heritage will be permanently lost.

Climate change also causes the loss of intangible heritage, the immaterial aspects of culture valued by communities (Jigyasu et al., 2013; Markham et al., 2016; Mínguez García, 2020). As climate change destroys the livelihoods and land of local communities, especially in coastal regions, they will be displaced and forced to migrate to and integrate with new communities, leading to the loss of original cultural traditions (Adger et al., 2012; Brabec & Chilton, 2015; Mínguez García, 2020). In their study of the Gullah community from the Sea Islands of South Carolina, Brabec and Chilton (2015) note that physical, manmade adaptation strategies are not viable for this area and abandonment and resettlement options must be

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considered for this cultural community. Resettlement will detrimentally impact the social structure of the community as members are separated from each other as well as fracture their relationship with the land itself, which is an essential aspect of the Gullah identity (Brabec & Chilton, 2015). Adger et al. (2012) agree that in response to climate change risks, planned resettlement is a likely possibility and that migration weakens social structures of source and destination communities. When people are displaced from places that they value, their cultures are diminished and at risk of being lost entirely (Adger et al., 2012). This is the case for the communities on the island of Eleuthera in the Bahamas (Brabec & Chilton, 2015). The intangible heritage (recipes, stories, local knowledge and skills) of Eleuthera is largely undocumented and primarily passed on through family traditions and oral transmission, so as the community is broken up due to migration and displacement, the intangible heritage is at risk of disappearing (Brabec & Chilton, 2015). Many studies focus on the physical impacts of climate change on tangible cultural heritage, but it is also important to consider the impacts on intangible cultural heritage and the effects of those impacts on communities.

Values of Cultural Heritage

Social Values

Cultural heritage is a way in which groups of people express their values and identity and organize communities and thus is essential to community well-being (Adger et al., 2012; Hambrecht & Rockman, 2017; Jigyasu et al., 2013). Often, cultural heritage is associated with a settlement of place and the identities of the local communities are created around these places (Adger et al., 2012). This concept of *place attachment* describes the connectedness between individuals and the place in which they live and the identity the individual creates around that place (Adger et al., 2012). Place attachment contributes to well-being and a sense of belonging

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and pride (Adger et al., 2012). In times of stress, people seek safety and security in what they know and in the connections with families, communities, and ancestors, which are represented and reflected in intangible and tangible cultural heritage (Brabec & Chilton, 2015; Jigyasu et al., 2013). Additionally, during the recovery from traumatic events, victims of disaster continue to search for the values, traditions, and identity in heritage (Brabec & Chilton, 2015; Jigyasu et al., 2013). The social networks that provide support and access to community assets, such as cultural heritage, are also important coping mechanisms for individuals and the entire community (Jigyasu et al., 2013). When forced to move from their home environment, individuals lose their sense of identity and social connections, resulting in feelings of grief (Adger et al., 2012).

Culture influences the way people interpret information and make decisions hence culture is important for framing and understanding climate change, adaptation, and mitigation (Adger et al., 2012; Brabec & Chilton, 2015; IPCC, 2014b). In turn, cultures are shaped by climate change, so culture is essential in understanding the causes, meanings of, and human responses to climate change (Adger et al., 2012). Because culture has a strong influence on the actions of individuals and groups, cultural heritage helps in the mitigation of and adaptation to climate change risks (Brabec & Chilton, 2015; IPCC, 2012; IPCC, 2014b; Jigyasu et al., 2013). For instance, place attachment shapes adaptive responses (Adger et al., 2012; Brabec & Chilton, 2015). When people are in fear of losing the places they are highly attached to, they are more likely to prepare for disasters and support and participate in adaptation processes (Adger et al., 2012).

Local and traditional knowledge are also important in responding to climate change risks (Adger et al., 2012; IPCC, 2012; IPCC, 2014a, b; Jigyasu et al., 2013). Each culture has differing views and beliefs on the natural environment that influence how they interpret and respond to climate change risks (Adger et al., 2012; Jigyasu et al., 2013). Local communities have learned

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how to predict and react to disasters and examining how groups used this knowledge to adapt in the past informs future strategies (Heathcote et al., 2017; IPCC, 2014a, b; Jigyasu et al., 2013; Markham et al., 2016). Local knowledge in areas such as medicine and agriculture help create sustainable development practices, healthy ecosystems, and food security (Brabec & Chilton, 2015). Traditional knowledge systems and skills strengthen communities' *resilience*, or the capacity to cope with and recover from disruptive events (Jigyasu et al., 2013; Mínguez García, 2020; O'Brien et al., 2015). Incorporating cultural heritage into resilience, mitigation, and adaptation strategies ensures community support, which is essential for the long-term success of such strategies (Brabec & Chilton, 2015; Mínguez García, 2020). However, Adger et al. (2012) note that though local knowledge and practices assist in adapting to climate change, they are less helpful in areas where rapid and unpredictable changes are occurring. When communities experience increasingly prolonged, intense disasters, such as droughts, or are unable to predict weather patterns, adaptive strategies are less effective (Adger, et al., 2012). Tensions between policy makers and communities and maladaptive outcomes are prevented when the cultural values of local communities are considered in government climate change adaptation policies (Adger et al., 2012; Fatorić and Seekamp, 2017). Without a cultural understanding of climate change risk, successful adaptation is not possible (Adger et al., 2012; Brabec & Chilton, 2015; Jigyasu et al., 2013).

Economic Value

Cultural heritage contributes economic value to communities thus is a resource essential to protect for current and future generations (Phillips, 2015). Tourism in particular is an important economic driver for cultural heritage (Jigyasu et al., 2013; Kaminski et al., 2014; Markham et al., 2016; O'Brien, 2015; Phillips, 2015). Tourism and cultural heritage are linked

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through a global industry with the quality of a destination's cultural offerings being a significant factor in tourist decision making (Kaminski et al., 2014). Since all places have cultural heritage, cultural heritage tourism is a focus for economic development (Timothy, 2014). As one of the largest economic sectors, tourism accounts for nine percent of global GDP and one in eleven jobs (Markham et al., 2016). Because it is a labor-intensive industry, tourism brings in foreign exchange earnings, and raises tax revenues (Timothy, 2014). Local businesses and livelihoods outside of the tourism industry also rely on tourists (Jigyasu et al., 2013). Without tourists, many local residents lose their sources of income (IPCC, 2012). Cultural heritage is a resource for tourism and has socio-economic implications for destination communities that can contribute significantly to their economic empowerment (Timothy, 2014).

The tourism sector is vulnerable to climate change because of its dependence on the environment (Hall et al., 2016; IPCC, 2014; Markham et al., 2016; O'Brien et al., 2016; UNESCO, 2012). The physical risks of climate change, such as extreme weather events, changing weather patterns, and sea level rise, cause increasing insurance costs, safety concerns, water shortages, and loss or damage to assets and infrastructure which reduce the attractiveness of heritage sites, ultimately lessening the economic opportunities available to communities (Hall et al., 2016; IPCC, 2012; Markham et al., 2016). However, while climate change decreases tourism in some areas, the rising temperatures caused by climate change increases tourism in others, which brings its own risks (Markham et al., 2016; O'Brien et al., 2015). Uncontrolled or unplanned tourism development causes cultural disruption, cultural commoditization, environmental problems, and physical damage to cultural sites (Brabec & Chilton, 2015; Kaminski et al., 2014; Markham et al., 2016). The economic opportunities associated with

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cultural heritage and tourism provide an incentive for nations and communities to protect cultural heritage assets (Markham et al., 2016; Timothy, 2014).

Museum Collections Care

Preventive Conservation

Operating in service to the public, museums have an ethical responsibility to protect and care for the collections entrusted to them as outlined in the codes of ethics from the International Council of Museum (ICOM) (2017) and the American Association of Museum (AAM) (2000). An important tool in performing a museum's ethical duty is preventive conservation (Bauer Kilgo, 2020; ICOM, 2017; Malaro & DeAngelis, 2012). *Preventive conservation* is defined as indirect actions to reduce the deterioration of and prevent possible damages to cultural property by providing optimum conditions (Bauer Kilgo, 2020; Malaro & DeAngelis, 2012; Sharif et al., 2013). In Edson's *Museum Ethics* (1997), Williams argues that preventive conservation is an ethic of the museum field because it promotes responsible behavior regarding collections care, involves the entire museum community, and is consistent with philosophies and practices of basic museum ethical standards. Preventive conservation reaffirms the preservation of objects as an essential museum function and demonstrates proper professional conduct, upholding the integrity of the field (Williams, 1997).

The policies and procedures of preventive conservation apply to many different aspects of museum work including environmental control, handling and maintenance, storage, exhibitions, and emergency preparedness and response (Bauer Kilgo, 2020). Preventive conservation focuses on the collection rather than individual objects and promotes nontreatment rather than treatment (Malaro & DeAngelis, 2012). The aim of preventive conservation is to avoid and minimize future losses (Lucchi, 2018). Because it is concerned with future damage,

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risk assessment is an important aspect of preventive conservation (Sharif, 2013; Waller, 1995). By assessing current and potential risk, museums make better decisions when considering preventive conservation actions (Waller, 1995). Climate change has become a significant factor in preventive conservation (Lucchi, 2018). The impacts of climate change on a museum's environmental conditions influences the development of preventive conservation practices and policies (Lucchi, 2018).

Disaster Preparedness and Emergency Response Plans

Also essential to preventive conservation are disaster preparedness and emergency response plans, which are required documents at both the international and national professional levels (AAM, n.d.-b; Cato, 2020a; ICOM, 2017). *Disaster preparedness and emergency response plans* help a museum assess and manage risk, protect human life, and recover from natural and manmade disasters (AAM, 2018; Cato, 2020a; Ferraro & Henderson, 2013). A museum's duty to care for collections held in the public trust requires an organization to protect against reasonably foreseeable disasters with a thorough disaster and emergency plan (Malaro & DeAngelis, 2012). A comprehensive emergency plan covers disaster prevention, preparedness, response, and recovery (Dorge & Jones, 1999; Ferraro & Henderson, 2013). For prevention and preparedness, plans identify potential risks; describe mitigation strategies; list contact information of staff members and emergency responders; outline staff responsibilities; and list required equipment and supplies (Cato, 2020a; Dorge & Jones, 1999). Malaro and DeAngelis (2012) add that during the planning phase, a museum should have records showing the process policymakers took to discuss and reach an agreement regarding disaster and emergency preparedness to protect the institutions against any legal ramifications.

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Saving lives is the primary concern, so actions performed during an emergency are critical (AAM, 2018; Ferraro & Henderson 2013). This response phase covers multiple evacuation routes with floor plans that provide instructions for exiting the building for staff and visitors as well as instructions for specific circumstances, such as the need to ensure that visitors with disabilities can safely evacuate (AAM, 2018; Cato, 2020a; Dorge & Jones, 1999). To ensure the safety of people on site, museum staff collaborate with local first responders (Phillips, 2014). Coordination between museum and heritage managers and response teams should also occur at the national level (Cassar, 2005; Mínguez García, 2020). Finally, during the recovery phase, damage is assessed and documented; objects are salvaged; conservation and recovery plans coordinated; and the entire emergency plan reviewed (AAM, 2018; Cato, 2020a). Assessing damage and collecting new data after a disaster helps develop new protection strategies (Mínguez García, 2020). However, emergency plans must be updated and reviewed regularly with input from key staff and organization-wide drills even if no emergencies have occurred (AAM, 2018; Ferraro & Henderson, 2013; Malaro & DeAngelis, 2012; Simmons, 2020). For the plan to be successful, it is essential for staff to be aware and trained in the procedures required before, during, and after an emergency (Cato, 2020a; Dorge & Jones, 1999; Ferraro & Henderson, 2013; Mínguez García, 2020). With a thorough disaster preparedness and emergency response plan, museums are better prepared to protect their collections, ensuring that they are being safely held in the public trust (AAM, n.d.-b).

Risk and Cultural Heritage

Climate change poses risks to human and natural systems (IPCC, 2014b). In relation to climate change, the IPCC (2014b) defines *risk* as “the potential for consequences where something of value is at stake and where the outcome is uncertain” (p. 127). In the context of

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climate change, it is also important to consider disaster risks because the extreme weather events caused by climate change will increase the probability and frequency of disasters (IPCC, 2012). *Disaster risk* is defined as “the likelihood over a specified time period of severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse effects that require immediate emergency response to satisfy critical human needs” (IPCC, 2012, p. 5). Management of risk is essential in reducing impacts of climate change. The IPCC (2014a) suggests iterative risk management as a framework for decision making because it is best for situations characterized by major uncertainties, long time frames, the potential for learning over time, and the influence of climate, socioeconomic, and biophysical changes. Climate change risks and the strategies to manage them vary by location, but in every situation, local communities and governments should be involved in the planning process (IPCC, 2012).

Recently, reducing disaster risk has been a major concern for cultural heritage professionals (Jigyasu et al., 2013; UNESCO et al., 2010). Protecting cultural heritage against disaster risk is also emphasized outside of the heritage sector at the international level in the United Nation’s *Sendai Framework for Disaster Risk Reduction 2015-2030* (2015), which states that anticipating, planning for, and reducing disaster risk is critical to more effective protection cultural heritage. UNESCO et al. (2010) define *disaster* as related to cultural heritage sites as “a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceeds the ability of the affected community or society to cope using its own resources” (p. 8). Both the IPCC (2014b) and UNESCO et al. (2010) note that disaster risk is a product of hazard and vulnerability. *Vulnerability* is the inherent weakness of a heritage site (UNESCO et al., 2010). A *hazard* is “any phenomenon,

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substance, or situation, which has the potential to cause disruption or damage to infrastructure and services, people, their property, and their environment” (UNESCO et al., 2010, p. 58). Hazards can be meteorological, hydrological, geological, biological, astrophysical, human-induced or climate change (UNESCO et al., 2010). In addition to being a direct hazard to heritage, climate change affects other underlying risk factors and increases vulnerability (UNESCO et al., 2010). For example, changes in weather that increase soil moisture affect the foundation of historic buildings, making them more susceptible to hazards such as earthquakes and floods (UNESCO et al., 2010). In this way, climate change is a risk multiplier (Cassar, 2011). Despite the recognition that disaster risks are increasing, reducing risk is not a priority for many heritage sites (Jigyasu et al., 2013; UNESCO et al., 2010). A study by UNESCO in 2012 examined sixty vulnerable World Heritage properties’ management systems and found that only six incorporated risk management components (Jigyasu et al., 2013). To ensure the long-term preservation of cultural heritage, it is critical that managers and professionals acknowledge, understand, and take action against disaster risks (Jigyasu et al., 2013).

Risk Management

In response to increasing disaster risk, international councils such as UNESCO and the United Nations state that cultural heritage sites should engage in disaster risk management (Jigyasu et al., 2013; UN, 2015; UNESCO et al., 2010). *Risk management* describes the steps and processes of effectively managing possible events and reducing the events’ negative effects, thus preventing existing hazards from turning into disasters (Wang, 2015). For cultural heritage, risk management also attempts to reduce risks to the heritage values imbedded in the site (UNESCO et al., 2010). These values should be the foundation on which plans and actions are based (UNESCO et al., 2010). There are three main stages of disaster risk management: *before*,

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which includes risk assessment, prevention, and mitigation measures; *during*, which includes emergency response procedures; and *after*, which includes assessment, treatment, rehabilitation, and review of the disaster management plan (UNESCO et al., 2010; Wang, 2015). Disaster management plans are different for every heritage site, but each addresses all three steps (UNESCO et al., 2010). For successful integration, policies and procedures must be understood by staff and outside stakeholders (UNESCO et al., 2010). Disaster management plans help cultural heritage managers more effectively and efficiently prepare for, respond to, and recover from disasters.

Disaster risk management is proactive, not reactive or passive, therefore *risk assessment*, or the identification of potential risks, is one of the most important steps in reducing risk (Jigyasu, 2020; Wang, 2015). Risk assessment is the process of identifying, analyzing, and evaluating potential risks and aids in creating informed predictions about the probability of unwanted events (Forino et al., 2016; Papathoma-Köhle et al., 2016). Heritage sites cannot be protected from risks unless these risks are identified and understood by heritage managers and stakeholders (Romão et al., 2016; Wang, 2015). Monitoring short- and long-term risk is an important step in risk assessment (Jigyasu, 2020). Since there is a high level of uncertainty surrounding climate change, monitoring increases the amount of data and understanding of the relationship between climate change and cultural heritage (Cassar, 2005). Once damaged or destroyed, the value of cultural heritage cannot be regained, thus risk assessment and prediction are critically important (Wang, 2015).

Risk assessment frameworks include reliable and sufficient data on assets under risk; suitable procedures to model the vulnerability; models to predict the consequences of the hazardous event; and sufficient resources (Romão et al., 2016). Recognizing the difficulties and

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barriers to risk assessment, researchers assist cultural heritage sites by developing tools and frameworks for heritage managers that are easy to use and adapt to fit each unique site (Anaf et al., 2014; Carroll & Aarrevaara, 2018; Coelho et al., 2020; Forino et al., 2016; Huijbregts et al., 2012; Leissner et al., 2015; Romão et al., 2016; Wang, 2015;). The Cultural Heritage Risk Index (CHRI), created by Forino et al. (2016), analyzes hazard, exposure, and vulnerability to assess climate change related risk and prioritize protective actions. Carrol and Aarrevaara's (2018) numerical scale index provides another method for prioritizing cultural heritage that helps managers determine where to best concentrate resources. Anaf et al. (2018) introduce an indoor air quality (IAQ) calculating algorithm that is a user-friendly, practical tool that aids cultural heritage guardians in managing the indoor environment, identifying hazards, evaluating the effectiveness of a mitigation action, and decision-making. Huijbregts et al. (2012), Muñoz González et al. (2020), and Leissner et al. (2015) present methods of predicting the effects of climate change on indoor and outdoor environments using simulation models. Finally, in a study on flood risk in New Taipei City, Wang (2015) stresses the importance of risk mapping and Geographical Information System (GIS) in identifying and planning for current and future risks. Using projections, managers set priorities and make better decisions about mitigation measures (Carroll & Aarrevaara, 2018; Cassar, 2005; Forino et al., 2016; Jigyasu, 2020; Jigyasu et al., 2013; Romão et al., 2016; Sesana et al., 2018). Many of these studies address the physical risks caused by climate change, but social and economic impacts should also be considered (Forino et al., 2016; Jigyasu et al., 2013). Risk assessment is time-consuming, expensive, and complex, but investing in planning and preparation is less expensive than post-disaster recovery (UN, 2015; UNESCO et al., 2010).

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Managing and reducing risk builds a culture of prevention and resilience (Jigyasu et al., 2013). In the context of disaster risk reduction, *resilience* is the ability of a community or society that is exposed to hazards to resist, absorb, accommodate to, and recover from the effects of a hazard (Macalister, 2015). An essential aspect of resilience is the ability to collaboratively adjust to changing circumstances, becoming better than the pre-disaster state (Jigyasu et al., 2020; Macalister, 2015; Mínguez-García, 2020). Collaboration and cooperation across all levels have specifically been identified by the United Nations in the *Sendai Framework for Disaster Risk Reduction 2015-2030* (2015) as guiding principles. Hence, it is important for cultural heritage managers to work with outside partners such as disaster management authorities, universities, NGO's, political leaders, local and national governments, researchers, emergency response teams, and local communities (Cassar, 2005; Jigyasu, 2020; Jigyasu et al., 2013; Macalister, 2015; Mínguez- García, 2020; UNESCO et al., 2010). Cultural heritage managers and professionals also build resilience by educating others on how to design mitigation, preparedness, response, and recovery plans, increasing awareness about climate change, and advocating for cultural heritage in global agendas (Cassar, 2005; Macalister, 2015; Wang, 2015). Knowledge of past and future hazards, risks, and vulnerabilities and collaboration with local, national, and international communities contribute to the creation of a sustainable disaster risk management plan and to a culture of resilience.

Risk and Museums

Museum collections are exposed to a number of risks, called the *agents of deterioration*, which include physical forces, fire, water, thieves and vandals, pests, pollutants, light and radiation, incorrect temperature, incorrect relative humidity, and disassociation (Bauer Kilgo, 2020). In order protect and preserve their collections, museums engage in *risk management*,

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which is the process of evaluating the chance of loss of damage to an object and then implementing steps to avoid, minimize, or eliminate the risk (Cato, 2020b). Risk management is an institution-wide activity that includes security, visitor services, integrated pest management, storage, insurance, preventive conservation, and disaster preparedness and emergency response (AAM, 2018; Cato, 2020b; Humphrey, 2018). The steps in formulating a risk management approach are to identify and assess the magnitude of a potential risk; identify strategies to eliminate the risk; determine the cost and benefit of the strategies; and establish a plan to implement the strategies (Cato, 2020b). To guarantee that risk management strategies remain effective, evaluation and revision should occur on a regular basis (Cato, 2020b). It is also crucial that staff be knowledgeable on risk management policies and procedures especially emergency preparedness plans and health and safety (AAM, n.d.-c; Cato, 2020b). As stewards of the public trust, museums must ensure the safety of their collections and essential to this mission is risk management (AAM, n.d.-c; Cato, 2020b).

Climate Change Adaptation

In addition to disaster risk management, climate change adaptation is necessary for reducing exposure and vulnerability and increasing resilience (IPCC, 2012; Papathoma-Köhle et al., 2016). *Climate change adaptation*, as defined by the IPCC (2012), is the process of adjustment to actual or expected climate and its effects. Adaptation can be *incremental*, where the central aim is to maintain the essence and integrity of existing systems, or *transformational*, which results in changes to the fundamental attributes of systems (IPCC, 2014). While disaster risk management addresses all hazards, climate change adaptation considers the long-term adjustment to changing average conditions (Papathoma-Köhle et al., 2016). Climate change adaptation requires understanding of disaster risk therefore risk assessment is an important step in the

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adaptation process (IPCC, 2014b; Papathoma-Köhle et al., 2016). To be successful, adaptation must occur at the international, national, and local levels (IPCC, 2014a, b).

A stronger link between climate change adaptation and disaster risk management is recognized by the IPCC (2012) and the *Sendai Framework for Disaster Risk Reduction 2015–2030* (2015). However, integration is difficult because the two fields use different terminology, come from different academic communities, and are seen as the responsibility of different government organizations (IPCC, 2012; Papathoma-Köhle et al., 2016). Another problem is that climate change adaptation and disaster risk management often operate at different scales (Papathoma-Köhle et al., 2016). Climate change adaptation focuses on long-term scenarios across a global scale while disaster risk management strategies are usually conducted at the regional or local level and focus on existing risks (Jigyasu, 2020; Papathoma-Köhle et al., 2016). To overcome these disconnections, Jigyasu (2020) suggests connecting global and local actions. The IPCC (2012) adds that coordination between the fields and implementation of government policymaking that considers the two topics aids in integration. Ultimately, disaster risk management helps climate change adaptation address current impacts, and conversely, climate change adaptation helps disaster risk management address future conditions that will differ from those of the present (IPCC, 2012). Overall, the synthesis of disaster risk management and climate change adaptation creates a more effective method of responding to risk, recognizing the complex relationships among the diverse social, temporal, and spatial contexts across different scales (IPCC, 2012).

Cultural Heritage and Climate Change Adaptation

To reduce risks, cultural heritage engages in climate change adaptation, but, as Mínguez García (2020) notes, climate change adaptation is a new challenge for cultural heritage.

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According to Sesana et al. (2018) adaptation measures are managerial and decisional, which include regulations, guidelines, and engagement with stakeholders, or practical, which are physical adaptations to the heritage site. Horowitz (2016) breaks down practical adaptations further into hard adaptations, defined as engineered, technical solutions that are generally large-scale projects, and soft adaptations, which incorporate the use of natural materials for engineered structures. However, Sesana et al. (2018) note that previous studies on climate change and cultural heritage primarily focused on the impacts of climate change and the research on adaptation has been limited to guidelines and recommendations. In their studies on climate change adaptation and cultural heritage, Fatorić & Seekamp (2017), Sesana et al. (2018), and Phillips (2014) identified the greatest barriers to adaptation which are: *institutional barriers*, which occur when there are limited legislative instruments or an absence of policies and guidelines; *technical barriers*, which relate to inefficient or lack of technical skills and limited procedures for gathering data; *financial barriers*, which refer to lack of funding, limited access to financial resources and limited financial willingness; and *social barriers*, which pertain to perceptions, values, and norms found within society. Based on the interviews and surveys conducted by Fatorić & Seekamp (2017), Sesana et al. (2018), and Phillips (2014), it is generally agreed by cultural heritage experts that climate change adaptation is possible through increased promotion of participation, collaboration, and awareness across all levels (Cassar, 2005; Fatorić & Seekamp, 2017; Mínguez García, 2020; Sesana et al., 2018).

Summary

The literature review explored the intersection of climate change and cultural heritage, the values of cultural heritage, museum collections care, risk and cultural heritage, and climate change adaptation and revealed that climate change is increasing risks to tangible and intangible

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cultural heritage. Researchers recognized that cultural heritage is an asset to society because it provides economic, social, and psychological benefits to communities. Museums and cultural heritage sites play an important role in protecting these values for future generations. In order to ensure the continued preservation of cultural heritage, climate change risks must be reduced. The literature identified disaster risk management and climate change adaptation as key strategies in risk reduction.

The literature review revealed a gap regarding climate change impacts on museum collections. The literature primarily focused on the effects of climate change on cultural heritage in general. While cultural heritage sites and museums both seek to preserve tangible and intangible heritage for future generations, museums have their own needs and ethical standards to meet thus require museum-specific research. In response to this gap the following research question was formed:

RQ: How can museums create disaster risk management and climate change adaptation strategies to better protect collections against increasing climate change risks?

The following chapter will expand on this question by presenting the methods used for the collection and analysis of data. Chapter 4 will discuss the project's findings. Finally, Chapter 5 presents final recommendations based upon the synthesis of the literature review and results of the data analysis.

Chapter 3:

Methods

Introduction

This research project sought to examine the ways in which museums can respond to increased climate change threats impacts in order to better protect their collections. To fully understand how museums are responding to climate change risks, a qualitative comparative case study of two museums, the Getty Center and Newark Museum of Art, was conducted. In addition, a textual content analysis of institutional, professional, scholarly, and popular press documents was performed. The methods chosen and data analysis process were informed by the research question:

RQ: How can museums create disaster risk management and climate change adaptation strategies to better protect collections against increasing climate change risks?

A comparative case study and textual and content analysis were selected as methodologies because of their ability to provide an in-depth analysis of contemporary events and to identify thematic patterns and meanings across texts and cases. The results of the analysis were used to provide recommendations on ways museums can better protect against climate change risks. This chapter offers a detailed description of the chosen methods, the rationale for the selections, the data collection and analysis process, as well as a discussion on the project's limitations.

Method Description and Rationale

Based on the research project's goal to determine how museums are responding and adapting to increased climate change risks, a comparative case study was chosen as an appropriate method. A *case study* is a qualitative approach in which the investigator explores a

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real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information, and reports a case description and case themes (Creswell & Poth, 2018; Schwandt & Gates, 2018). A case study is an appropriate method when a *how* or *why* question is being asked about contemporary events that the researcher has little control over (Yin, 2018). Because the research question sought to answer how museums are responding to climate change risks and examined a contemporary event, climate change, a case study was selected.

Case studies differ from other methods of qualitative research because they are defined by its *case*, the unit of analysis that is being studied, rather than the focus of the study (Merriam & Tisdell, 2016). A case can include anything, such as an individual, a community, decision process, or event (Creswell & Poth, 2018). To be considered a case, the unit or phenomenon being studied must be bounded (Creswell & Poth, 2018; Merriam & Tisdell, 2016). A case is *bounded* when the researcher specifies what elements of the case will be studied, including the time frame to be included, the exact physical locations that are a part of the research, and other key aspects of the case (Moore, Lapan & Quartaroli, 2012) Bounding a case study “allows the researcher to use valuable investigative time for in-depth observations that produce rich, detailed case descriptions” (Moore, Lapan & Quartaroli, 2012, p. 246).

There are multiple types of case studies researchers can utilize, such as *instrumental* case studies, in which a case is used to gain insights into a phenomenon, and *intrinsic* case studies, in which the case itself is of primary interest, as defined by Stake (1995), and *collective case studies* in which multiple cases are selected to better illustrate a single issue (Creswell & Poth, 2018). Moore, Lapan, and Quartaroli (2012) add that multiple case studies are often designed for comparative purposes, called *comparative case studies*. Yin (2018) and Creswell and Poth

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(2018) note that multiple-case studies are likely to be stronger than single-case studies because they result in more substantial findings and create analytic benefits. Including more than one case in a study also provides different perspectives on the issue and enhances *generalizability*, the extent to which a statement or conclusion applies to populations or settings not included within the context of a specific study of the findings (Creswell & Poth, 2018; Merriam & Tisdell, 2016). For these reasons, a comparative case study was selected.

The two museums used as cases were the Getty Center, located in Los Angeles, California, and the Newark Museum of Art, located in Newark, New Jersey. Both institutions are American Alliance of Museum (AAM) accredited art museums that have been impacted by climate change risks within the past decade. The Getty Center was chosen because of its position as a leader within the field, particularly in the area of preventive conservation. Of note is its conservation research center, the Getty Conservation Institute, which is dedicated to advancing the conservation practice through scientific research and field work. The Getty Conservation Institute has been established as a trusted source of information regarding issues of preservation and preventive conservation and has been at the forefront of the development of sustainable conservation practices. The Getty Center was also chosen because of its innovative building adaptations. The Getty Center is vulnerable to wildfires, which, due to climate change, are increasing in frequency and intensity. In response to this threat, the Getty Center was designed with a number of fire prevention techniques, such as the construction of the buildings out of fire-resistant materials and a special air system that recirculates air to keep smoke out. Overall, the Getty Center provided an example of a museum actively dedicated to preventing climate change risks. The Newark Museum of Art was selected to serve as a contrast to the Getty Center. It is a mid-sized museum that lacks the extensive resources that the Getty has, but is a reputable and

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respected institution. Like the Getty Center, the Newark Museum of Art is vulnerable to climate change risks, specifically the increased frequency and intensity of storms, hurricanes, and flooding. Ultimately, the Getty Center and Newark Museum provide two distinct perspectives on the museum field's response to climate change risks.

Sources found in case study research include *documentation, archival records, interviews, direct observations, participant observation, and physical artifacts* (Yin, 2018). For this research project, collections management policies, mission statements, disaster preparedness and emergency response plans, scholarly literature, and institutional and popular press articles were collected. Since only documents were used, textual analysis was another research method utilized. *Textual analysis* is a method of data analysis that examines the content and meaning of texts (Lockyer, 2008). It is the methodological process in which researchers describe and analyze language, symbols, and pictures present in texts to gain information regarding the messages, meanings, and values being sent through them (Hawkins, 2017; Smith, 2017). Examples of texts include books, photos, ads, interviews, performances, social media, film, television, and historical artifacts (Hawkins, 2017). The purpose of textual analysis is to describe the content, structure, and functions of the messages contained in texts and can be applied to visual, written, or recorded texts (Frey et al., 1999). Hawkins (2017) and Lockyer (2008) recognize that texts are polysemic, meaning that they hold multiple meanings and can be interpreted, understood, and valued in multiple ways. Therefore, textual analysis does not identify a single, correct interpretation of the text, but rather, the possible interpretations based the on the review and analysis of the text (Lockyer, 2008).

Since the research was focused on the texts' underlying themes and patterns, a content analysis was conducted. *Content analysis* is used to identify, enumerate, and analyze occurrences

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of specific messages and message characteristics embedded in texts (Frey et al., 1999). It is a flexible method that provides a systematic way of synthesizing a wide range of data (Julien, 2008; Maier, 2017). A content analysis should be objective, systematic, replicable, and valid (Krippendorff, 2003; Maier, 2017). Because the results of this project needed to be objective, replicable, and valid in order to inform the recommendations and best practices for museums trying to mitigate climate change risks, a content analysis was an appropriate approach.

Data Collection

The five types of texts collected from the Getty Center and Newark Museum of Art include collections management policies, mission statements, disaster preparedness and emergency response plans, scholarly literature, and institutional and popular press articles. A *collections management policy* includes all policies and procedures that are required to document, care for, and develop museum collections (Simmons, 2020). *Disaster preparedness and emergency response* plans help ensure the safety of staff, visitors, and collections by identifying potential risks and outlining steps that can minimize damage before, during, and after emergencies (Cato, 2020a). A museum's *mission statement* state defines the museum's identity and purpose and articulates the museum's understanding of its role and responsibility to the public and its collections (AAM, n.d.-d; Anderson, 2019). These three institutional documents were important to analyze because they are core documents required by the AAM that exemplify a museum's core values and guide the museum's actions towards fulfilling its mission to preserve collections for future generations (AAM, n.d.-b). Information was also collected from texts published on the museums' websites. Documents created by individuals and organizations not affiliated with either museum, offered insight into how these museums viewed climate change risks and the actions they intended to take to mitigate these risks. Additionally, the

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scholarly literature and popular press articles provided an outside perspective on the museums, creating a more comprehensive analysis. The documents were identified through Google searches and the museums' websites. Museum staff were contacted to obtain documents that were unavailable online. Once the documents were collected, an initial, thorough read through was done to determine relevance to the research questions and potential themes. The identified data were then analyzed using textual, content, and cross-case analyses.

Data Analysis

Creswell and Poth (2018) outline three steps to qualitative data analysis: reading and memoing emergent ideas; describing and classifying codes into themes; and developing and assessing interpretations. As suggested by Merriam and Tisdell (2016), in a qualitative study, data analysis occurs simultaneously with data collection. As such, while documents were selected and read during the collection process, memos were written that included any notes, potential themes, and connections found within the sources. During this stage, to learn more about the two cases, a *within-case analysis* was conducted, which included a detailed description that described the facts and contextual variables of the cases (Yin, 2018). For ease of retrieval during analysis, all information about the cases, including memos and detailed descriptions, were organized into a case study database using Microsoft (Word). The data was then organized further by *coding*, or the reduction of the data into segments and the assignment of names to the segments (Creswell & Poth, 2018; Moore, Lapan & Quartaroli, 2012). Once codes were created, similar codes were arranged into larger themes. The codes and themes were then input into an Excel spreadsheet that aided in organizing and accessing the data as well as in revealing possible connections between categories.

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After organizing the data into codes and themes, a *cross-case analysis* was conducted. Yin (2018) suggests using a cross-case analysis when studying two or more cases and involves examining the similarities and differences across the cases. To do this, the codes and themes were separated according to case and put into a Word table. This visual representation of the data allowed for easier comparison. As the texts were repeatedly reviewed, the codes were reworked in the spreadsheet and Word table to accurately reflect new insights and themes. Converging themes identified in the texts were also analyzed through *triangulation*, in which multiple sources of data are collected to confirm emerging findings thus enhancing the validity of the study (Creswell & Poth, 2018; Merriam & Tisdell, 2016; Yin, 2018). Once the data was exhausted, final themes were identified and concluding interpretations were formed. The content and cross-case analyses of this research project was completed over a two-month period, from December 2020 through February 2020. The results of the analysis are presented in Chapter 4 titled *Findings*.

Limitations

As qualitative research methods, case study, textual analysis, and content analysis have their limitations. Both case studies and content analysis require extensive time and resources (Maier, 2017; Yin, 2018). For example, when developing case study research, it takes time and effort to identify what case to choose, how many to choose, and how to bound the case or cases in a way that is not too narrow or too broad (Creswell & Poth, 2018). Similarly, selecting, sampling, and coding texts is a time-consuming process. Due to the time restrictions of this project, a limited number of documents were collected and analyzed and only two cases were chosen. Choosing a multi-case study for this project had its advantages, but it also limited the amount of in-depth analysis that occurred, as time and resources needed to be split between both

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cases rather than focusing on one (Creswell & Poth, 2018). In addition, the time restrictions limited the types of sources to textual documents available online when it is typically suggested that a case study rely on as many types of sources as possible (Yin, 2018). Focusing solely on texts can cause the researcher to neglect the producer and reader in the construction of meaning (Lockyer, 2008).

A common critique of case study and content analysis research is the lack of *generalizability*, meaning that the findings of a case study cannot be applied to broader populations outside of the specific case that was studied (Maier, 2017; Norander & Brandhorst, 2017). Because case studies examine a specific and unique case or cases, it can be difficult to generalize the results of the research (Yin, 2018). This is true for this project as each museum has different resources and contexts, which means that the best practices for one museum may not be applicable to another. Content analysis can be difficult to generalize because it is difficult to collect a representative sample of texts and because of the various coding categories that can be created (Maier, 2017).

In addition, when conducting textual and content analysis, the researcher brings their own understanding of the world, which affects the interpretation of the texts (Hawkins, 2017). The findings of a textual analysis will reflect the perspective of the researcher (Lockyer, 2008). Furthermore, texts are open to multiple interpretations (Lockyer, 2008). As a result, the findings reported in this project were influenced by the researcher's personal background, values, and biases and is just one of many possible interpretations. Researchers who attempt to replicate this study may interpret the texts in varying ways, resulting in different conclusions. Despite these limitations, case study, textual analysis, and content analysis allowed the researcher to conduct

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an extensive in in-depth investigation into the relationship between museum practices and policies and climate change risks, helping to fill an important research gap.

Summary

As discussed in this chapter, a qualitative comparative case study and textual content analysis were selected as this project's methodology. The chosen methodology sought to answer the research question:

RQ: How can museums create disaster risk management and climate change adaptation strategies to better protect collections against increasing climate change risks?

A case study allowed for a thorough and detailed investigation into a contemporary phenomenon, climate change, and its effects on the Getty Center and the Newark Museum of Art. The systematic and extensive review of documents using textual and content analysis identified key themes that were then compared through a cross case analysis. The results and interpretations from this analysis are presented in the following chapter titled *Findings*. Chapter 5 will then present recommendations and best practices museums can utilize for protecting their collections against climate change risks.

Chapter 4: Findings

Introduction

As demonstrated throughout this document, the review of scholarly literature revealed the importance of protecting cultural heritage against increasing climate change risks in order to preserve its social and economic values and of risk management and climate change adaptation strategies. However, a gap in the scholarly literature was identified regarding museums and climate change risks. The literature addressed how cultural heritage sites in general should respond to climate change but not museums specifically. The museum field currently lacks replicable, sustainable climate change adaptation policies and procedures that protect collections against increasing risks. Thus, the research project sought to answer the following research question:

RQ: How can museums create disaster risk management and climate change adaptation strategies to better protect collections against increasing climate change risks?

As described in Chapter 3, the researcher conducted a qualitative, comparative case study focused on the Getty Center and the Newark Museum of Art. Additionally, textual and content analyses of the museums' mission statements, collections management policies, and disaster preparedness and emergency plans, popular press articles, and educational publications were conducted. Through the data collection and analysis process, the following themes emerged as ways the museums can respond to climate change risks: 1) institutional mission, values, and policies, 2) research, 3) education and training, 4) physical prevention, and 5) collaboration. The following chapter will present the ways in which the themes appeared in the Getty Center's and

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the Newark Museum of Art's activities and will conclude with a discussion of the convergences and divergences of the two cases.

The Getty Center

Opened in 1997 in Los Angeles, California, the Getty Center houses the J. Paul Getty Trust, the world's largest cultural and philanthropic organization dedicated to the visual arts. The J. Paul Getty Trust is comprised of the J. Paul Getty Museum, the Getty Research Institute (GRI), the Getty Conservation Institute (GCI), and the Getty Foundation. The J. Paul Getty Museum was originally opened in 1954 in J. Paul Getty's ranch house in the Pacific Palisades and was later moved to the newly designed Getty Center campus in 1997. Its collection is comprised of Greek, Roman, and Etruscan art; European art, including illuminated manuscripts, paintings, drawings, sculpture, and decorative arts; and international photography. The GRI was established in 1982 and is dedicated to furthering knowledge and advancing understanding of the visual arts through its research library, exhibitions, publications, and scholars program. Founded in 1985, the GCI is a private international research institution dedicated to advancing conservation practice through scientific research, education and training, and publications. The Getty Foundation, established in 1984, supports the understanding and preservation of the visual arts through strategic grant initiatives.

Institutional Mission, Values, and Policies

Mission Statement. The Getty Center, Getty Museum, GRI, GCI, and Getty Foundation each of their own mission statement, presented in Table 1.

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Table 1

Mission Statements of the Getty Center and Constituent Programs

Organization	Mission Statement
The Getty Center	<p>Getty advances and shares the world’s visual art and cultural heritage for the benefit of all.</p> <p>Getty is a cultural and philanthropic institution dedicated to the presentation, conservation, and interpretation of the world’s artistic legacy. Through the collective and individual work of its constituent programs—Getty Conservation Institute, Getty Foundation, J. Paul Getty Museum, and Getty Research Institute—Getty pursues its mission in Los Angeles and throughout the world, serving both the general interested public and a wide range of professional communities in order to promote a vital civil society through an understanding of the visual arts.</p>
J. Paul Getty Museum	<p>The J. Paul Getty Museum seeks to inspire curiosity about, and enjoyment and understanding of, the visual arts by collecting, conserving, exhibiting and interpreting works of art of outstanding quality and historical importance.</p>
Getty Conservation Institute	<p>The Getty Conservation Institute (GCI) works internationally to advance conservation practice in the visual arts—broadly interpreted to include objects, collections, architecture, and sites. The Institute serves the conservation community through scientific research, education and training, field projects, and the dissemination of information. In all its endeavors, the GCI creates and delivers knowledge that contributes to the conservation of the world's cultural heritage.</p>
The Getty Research Institute	<p>The Getty Research Institute is dedicated to furthering knowledge and advancing understanding of the visual arts and their various histories through its expertise, active collecting program, public programs, institutional collaborations, exhibitions, publications, digital services, and residential scholars programs. Its Research Library and Special Collections of rare materials and digital resources serve an international community of scholars and the interested public. The Institute's activities and scholarly resources guide and sustain each other and together provide a unique environment for research, critical inquiry, and scholarly exchange.</p>
The Getty Foundation	<p>The Getty Foundation fulfills the philanthropic mission of the Getty Trust by supporting individuals and institutions committed to advancing the greater understanding and preservation of the visual arts in Los Angeles and throughout the world. Through strategic grant initiatives, it strengthens art history as a global discipline, promotes the interdisciplinary practice of conservation, increases access to museum and archival collections, and</p>

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	develops current and future leaders in the visual arts. It carries out its work in collaboration with the other Getty Programs to ensure that they individually and collectively achieve maximum effect.
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Each mission statement adheres to best practices, stating what the organization does, for whom, and why and clearly articulates its role and responsibility to the public and its collection (AAM, n.d.-c). Using these mission statements, the Getty Center’s purpose and focus can be identified. Notably, a major focus across the mission statements is conservation. As the central organization, the Getty Center (n.d.) explicitly states its dedication to the conservation of cultural heritage. This core value is reflected in the Getty Museum’s (n.d.) mission statement, which states is intent to conserve artwork; the GCI’s (n.d.-d) statement to “work internationally to advance conservation practice” and to “create and deliver knowledge that contributes to the conservation of the world’s cultural heritage”; and the Getty Foundation’s (2019) mission to “support individuals and institutions committed to advancing the greater understanding and preservation of the visual arts” and to “promote the interdisciplinary practice of conservation.”

The mission statements also highlight additional values that are important in protecting collections from climate change risks, specifically education and collaboration. The GCI (n.d.-d) states its commitment to serving the conservation community “through scientific research, education and training, field projects, and the dissemination of information.” By conducting research, raising awareness of conservation issues, and training professionals, the GCI helps other museums and cultural heritage sites better preserve their collections. The Getty Foundation (2019) also asserts its intention to support outside individuals and institutions that are dedicated to the preservation of collections as well as other Getty programs. In addition, the Getty Foundation (2019) promotes an interdisciplinary practice of conservation and the development of future professionals.

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Collections Management Policy. The Getty Museum's *Collection Policy* (2019) adheres to the requirements outlined by the AAM (n.d.-a) and includes the policies and procedures that ensure that the Getty Museum is meeting its legal and ethical obligations to protect and make accessible the collections held in the public trust (Simmons, 2020). According to its Purpose of the Collection Policy section, the policy is meant "to document and consolidate the policies that guide the development and care of the Museum's art collection, consistent with the Museum's mission and with relevant professional standards," and to "assure that the collection is protected, secured, and preserved" (The Getty Museum, 2019, p. 1). The section most relevant to the research question is Care of Collections. In adherence to the museum's mission statement, the *Collection Policy* (2019) states, "Conservation is essential to the Museum's stewardship of its collection" (p. 8). It adds that, "The Museum shall provide a safe, stable, and appropriate environment for the collections, with effective security and environmental control, for the benefit of present and future generations" (The Getty Museum, 2019, p. 8). Through these statements, the Getty Museum is affirming that through conservation, it is working to minimize the risks to the collections.

Disaster Preparedness and Emergency Response Plan. Though the researcher was unable to obtain a copy of the Getty Museum's Disaster Preparedness and Emergency Response Plan, the Getty Center demonstrates its dedication to disaster preparedness through other means. In 1992, the GCI and the Getty Museum offered a joint workshop on emergency planning for collecting institutions to help them better prepare and respond to emergencies. From 2004 to 2008, the GCI partnered with ICOM and ICCROM to create the Teamwork for Integrated Emergency Management (TIEM) course to assist museum personnel in safeguarding their collections from the effects of natural and human-made emergencies. In addition to courses, the

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GCI published information designed to help museums develop their disaster plans, such as *Building an Emergency Plan: A Guide for Museums and Other Cultural Institutions* by Valerie Dorge and Sharon Jones (1999). The GCI is also a part of the Heritage Emergency National Task Force, a partnership of 60 national service organizations and federal agencies co-sponsored by the Federal Emergency Management Agency (FEMA) and the Smithsonian Institution that works to protect cultural heritage from the damaging effects of natural disasters and other emergencies. These efforts show the Getty Center's commitment to disaster preparedness and emergency response.

Research

In line with its mission, the Getty Center engages in research initiatives and educational practices that raise awareness of conservation issues. Through the GCI, the Getty Trust dedicates its resources and influence to contribute to the field's understanding of conservation practices. Since its creation in 1985, research and the dissemination of information have been a core value of the GCI, which sought to undertake projects that were urgent issues, important to the field, and lacked sufficient research (Bridgland, 1995). Two issues of importance to climate change risks and collections that were studied by the GCI during its early years were disaster preparedness and response and preventive conservation.

Disaster Preparedness and Response. In 1985, the GCI held an international meeting on disaster preparedness and response, which led to the creation of an interdisciplinary steering committee and several efforts intended to assist in the protection of cultural property from disasters (Bridgland, 1995). Later in 1992, the GCI collaborated with the J. Paul Getty Museum to offer a joint workshop on emergency planning for collecting institutions, which was designed to provide instruction and guidance to museum directors and senior staff on how to prepare for

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and respond to an emergency (GCI, n.d.-a). In 2004, the GCI began a collaboration with ICOM and ICCROM called Teamwork for Integrated Emergency Management (TIEM), a course to assist museum personnel in safeguarding their collections from the effects of natural and human-made emergencies. Encompassed by the broader framework of ICOM's Museums Emergency Program (MEP), the goal of TIEM was to increase the capacity of museum professionals in integrated emergency management (GCI, 2012). Together, these initiatives helped raise awareness about the importance of developing disaster and emergency response plans.

Preventive Conservation. As with disaster preparedness and emergency response, the GCI has been dedicated to preventive conservation research since its creation (Bridgland, 1995; GCI, n.d.-f). From 1985 to 1998, the GCI studied environmental controls, appropriate storage, and the monitoring of objects, and engaged in projects that dealt with issues like evaluations of energy conservation; museum climatology and environmental requirements of unique artifacts; and the moisture-buffering capacity of museum storage cases (GCI, n.d.-f). The GCI continued its research of preventive conservation into the 21st century, focusing on the development of economical and sustainable environmental management strategies and investigating alternatives to conventional HVAC and lighting systems (Dardes & Staniforth, 2015). The GCI's past work in preventive conservation reflects the evolving interests of the field as well as the evolution and expansion of preventive conservation practices (Dardes & Staniforth, 2015).

The GCI continues its preventive conservation research through the Managing Collection Environments Initiative (MCE), which began in 2015. The initiative “focuses on the outstanding issues and questions relating to sustainable collection environments” and “aims to inform environmental strategies for collections, taking into consideration the types of buildings and environmental systems that will sustain climatic conditions” (GCI, 2015). Through lab- and

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field-based research, the GCI conducts studies that seek to improve the understanding of conditions that promote irreversible materials damage, filling research gaps that will inform long-term preservation strategies for the preservation of collections (Dardes & Staniforth, 2015; Zagorski, 2019). The GCI's past and present research on preventive conservation, as well as disaster and emergency response, have greatly influenced the practice of cultural heritage conservation.

Education and Training

Publications. According to GCI project specialist Kathleen Dardes and GCI senior scientist James Druzik (2000), one of the most effective ways to implement conservation practices over the long term is through education and training. The dissemination of their findings through educational publications and courses and has been a central value to the GCI since its creation in 1985 and a part of its mission (Bridgland, 1995; GCI, n.d.-d). A critical component to the work of the GCI is making publications available to conservation professionals to assist them in their work (GCI, n.d.-e). On the GCI's website are over 254 of the GCI's titles in a downloadable PDF format and the GRI's online Research Library has a Conservation Collection that contains over 55,000 titles. Publications that relate to the GCI's research in preventive conservation include *Historical Perspectives on Preventive Conservation* and *The Conservation Assessment: A Proposed Model for Evaluating Museum Environmental Management Needs*. Another important publication related to the GCI's work on disaster and emergency preparedness is *Building an Emergency Plan: A Guide for Museums and Other Cultural Institutions*. These publications help spread conservation best practices to other conservation and museum professionals throughout the world.

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In addition to books, the GCI also publishes its own newsletter called *Conservation Perspectives, The GCI Newsletter*. Seventy-five issues are available on the GCI's website. The newsletter was redesigned in 1991 in order to target a wider constituency beyond the traditional conservation audience and to bring about a better understanding of the modern threats to cultural property (Bridgland, 1995). The topics of the newsletters vary and include articles written by GCI staff as well as other outside conservation specialists and scholars. Many of the issues address the important topics of preventive conservation (Summer 2000 *Preventive Conservation*, and Spring 2004 *Implementing Preventive Conservation*), emergency management (Spring 2008 *Emergency Management*), collections environments (Spring 2007 *Environmental Management*, Fall 2015 *Collections Environments*, and Fall 2018 *Collections Environments*), research (Spring 1999 *Science at the GCI*, Summer 2005 *Conservation Science*, Spring 2010 *Collections Research*, and Spring 2020 *Conservation Science*), and education (Fall 2003 *Conservation Education*, Spring 2009 *Conservation Education at the GCI*, and Fall 2020 *Built Heritage Conservation Education and Training*).

Notably, the newsletters also address heritage and climate change. Its Spring 2011 issue was dedicated to the topic *Sustainability and Heritage* and contains articles that address sustainability and cultural heritage preservation. Of note is Cassar's (2011) article, "Impact of Climate Change on Cultural Heritage: From International Policy to Action." Cassar is the director of the UCL Centre for Sustainable Heritage and is known for her work that investigates the impact of climate change on cultural heritage and was a part of the first and most significant research project examining climate change and cultural heritage, *Noah's Ark: Global Climate Change Impact on Built Heritage and Cultural Landscapes*. In her article, Cassar (2011) calls for a multi-dimensional understanding of the impact of climate change on cultural heritage. To

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mitigate and adapt to climate change risks, Cassar (2011) suggests that heritage institutions develop an interdisciplinary approach to research and training, focus on damage risks to collections, and influence public behavior.

Additionally, the Fall 2018 issue, *Collection Environments*, contains the article “Challenges of Managing Collections Environments,” in which Ashley-Smith (2018) argues that the management of collection environments requires a holistic approach that goes beyond the museum itself. He notes that one factor that will affect the museum environment is climate change, stating that the changes in external climate will affect energy consumption in museums, requiring new hardware to better regulate those changes (Ashley-Smith, 2018). By publishing these issues of the GCI newsletter with Cassar’s (2011) and Ashley-Smith’s (2018) articles, the Getty Center is helping to spread awareness of climate change impacts on cultural heritage.

While the content of the GCI’s publications and courses are important, the institute is also working to develop the way the information is disseminated. The GCI remains committed to print publications, but also seeks to utilize electronic media to make information for widely available (Teutonico, 2015). This includes adding richer content on the GCI website, the continuing digitization of out-of-print publications to make them available free of charge as PDFs, offering course materials online, and using new media like videos (Teutonico, 2015). This approach, paired with a training programs that are focused on long-term planning, management, and decision-making strategies built on new ideas and relationships, creates a more sustainable educational strategy that will more effectively raise awareness of important conservation issues within the field and beyond (Teutonico, 2015).

Training and Courses. An important supplement to publications is training, a key point in the GCI’s (n.d.-d) mission statement. The GCI’s major research initiatives often have training

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courses or workshops associated with them that are open to conservators and other heritage professionals around the world. For example, as a result of the GCI's research on disaster preparedness and response, the Teamwork for Integrated Emergency Management (TIEM) course was developed. Similarly, the GCI's early research on preventive conservation led to the development of a series of courses from 1990-1995, called Preventive Conservation: Museum Collections and Their Environment, which were designed to encompass both technical information and the management skills essential for implementing preventive conservation within museums (Dardes & Staniforth, 2015).

For one of its current projects, Managing Collections Environment Initiative (MCE), the GCI is developing courses aimed to “raise the conservation profession's awareness of a holistic approach in collection management and climate control, taking into account climate, building and collection typologies and resulting in more sustainable strategies for managing collection environments,” (GCI, 2016). In 2017, the MCE launched Preserving Collections in the Age of Sustainability, a three-phase course designed for mid-career professionals and aims to disseminate recent research and thinking on technical aspects of environmental management (GCI, 2019). Joel Taylor, GCI senior project specialist and one of MCE's project managers states that, “We designed this course for those who are confronted daily with climate issues, and who are involved with making decisions about collections care at their institutions while understanding the assumptions in their own practice,” (Zagorski, 2019). In addition to learning conservation techniques, participants develop skills needed to listen, influence, and lead, and will return to their institutions with the ability to apply the information and skills they learned, expanding their knowledge further (Zagorski, 2019).

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The GCI has also offered educational programs centered on climate change. For instance, in 2008, the GCI and the Natural Resources Defense Council organized a lecture called *Climate Change and Preserving Cultural Heritage in the 21st Century*. The panel consisted of cultural heritage and environmentalists who discussed the ways in which climate change will impact the historic built environment and how core values of historic preservation can help in addressing this issue (GCI, n.d.-c). Through this lecture, the GCI (n.d.-c) recognized the growing threat of climate change and acknowledged that though cultural heritage professionals have delayed their response to climate change, there is “is a growing urgency to document the ways climate change affects our historic built environment, and to implement preventive and corrective actions.”

Climate change and its impacts are also being incorporated into courses not directly related to sustainability or climate change specifically. In a 2013 course offered by the GCI and ICCROM, *International Course on Stone Conservation: Environmental Factors of Deterioration*, the instructor Peter Brimblecombe includes climate change in the course’s content outline. Brimblecombe references the *IPCC Fourth Assessment Report: Climate Change 2007*, acknowledging that climate change will put outdoor stone heritage at risk and encourages student to consider what effects that may have on conservation practices (Brimblecombe, 2013). It should also be noted that Brimblecombe has written extensively about climate change and cultural heritage, including the important work, *The Atlas of Climate Change Impact on European Cultural Heritage: Scientific Analysis and Management Strategies* (2010).

Physical Prevention

The Getty Center has applied its knowledge of preventive care and risk management to the protection of its own collections through physical building design. Located in Los Angeles, the Getty Center is vulnerable to wildfires, which, due to climate change, are becoming more

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frequent and more intense (IPCC, 2014a). One of the most recent wildfires to threaten the Getty Center, called the Getty Fire, occurred on October 28, 2019 and consumed over 600 acres to the north and west of the Getty Center (Shamberg & Stephan, 2019; Shukla, 2019). However, the Getty Center's president and CEO James Cuno assured the public that the Getty Center is the safest place for art during a wildfire (Cuno, 2020). The Getty Center was prepared due to the building design, landscaping, and staff training.

Exterior Fire Prevention. The Getty Center was designed and built by Richard Meier & Partners Architects with fire prevention in mind (Cascone, 2019; Cummins, 2018; Shukla, 2019). The building's exterior walls are made from highly fire-resistant travertine stone and reinforced protected steel, while the interior walls are made from concrete (Cummins, 2018; Cuno, 2020; Gammon, 2019; Shamberg & Stephan, 2019). The roofs are covered in crushed stone aggregate, which prevent embers from igniting (Cascone, 2019; Cuno, 2020; Gammon, 2019; Shamberg & Stephan, 2019; Shukla, 2019). The 24-acre campus is laid with open spaces that help slow down the spread of a fire (Shamberg & Stephan 2019). In addition to the architecture, the center's landscaping is designed to be fire-resistant, which only includes fire-resistant acacia shrubs and oak trees (Cascone, 2019; Shamberg & Stephan, 2019; Shukla, 2019). The brush is cleared regularly, and the trees are routinely pruned to remove potential fuel for a fire (Gammon, 2019; Shamberg & Stephan, 2019; Shukla, 2019). Under the ground is a network of irrigation pipes connected to a one-million-gallon water tank (Cummins, 2018; Gammon, 2019; Shukla, 2019). Sprinklers activate as soon as fire touches the ground (Gammon, 2019; Shukla, 2019). If a fire is anticipated, as with the Getty Fire, the grounds are soaked ahead of time as an extra preventive measure (Cascone, 2019; Shamberg & Stephan, 2019;).

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Interior Fire Prevention. The Getty Center has additional fire-resistant measures inside buildings. The buildings are designed with fire separations; automatic fire doors that close to prevent the spread of fire and smoke to other areas. (Cummins, 2018; Shamberg & Stephan, 2019). These self-contained modules also have their own carbon-filtered air conditioning system that maintains a pressure flow, which can be increased as needed, that pressurizes the building to keep smoke and ash out (Cummins, 2018; Gammon, 2019; Shamberg & Stephan, 2019; Shukla, 2019). As a last resort, the buildings are also equipped with a sprinkler system, but since water can damage artwork, the pipes are kept dry until there is an emergency (Cummins, 2018; Shamberg & Stephan, 2019; Shukla, 2019).

Staff Training and Collaboration. Essential to the success of the Getty Center's fire prevention plan are its well-trained staff and relationship with first responders. There are many teams that actively assist with fire preparation and response year-round and during emergencies. For example, the grounds and garden staff continually monitor temperature, humidity, and ground conditions, looking out for dry conditions and high wind that may increase fire risk (Cuno, 2020; Shamberg & Stephan, 2019). The Getty staff also works closely with emergency responders and coordinate efforts with firefighters when an emergency is occurring (Shamberg & Stephan, 2019) Staff will help saturate the ground where firefighters are working and even offer the center as a safe space where firefighters can rest and monitor and manage their work (Cascone, 2019; Shamberg & Stephan, 2019;). Furthermore, the Getty Center's staff train with the city's fire department and test the building's emergency response system annually (Cummins, 2018; Shulka, 2019). This training of staff and coordination with local first responders are essential for a successful emergency plan (Cato, 2020; Dorge & Jones, 1999; Ferraro & Henderson, 2013; Mínguez García, 2020). According to Mike Rogers, the Getty

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Center's director of facilities, "Emergency planning and safety are things we do all year round. That's part of our Getty culture, to think about fire safety," (Shamberg & Stephan, 2019). The Getty Center and its staff understand that emergency preparedness is an effort that should occur continuously and must be enacted at all levels, from the building itself to those who work in it.

Collaboration

Internal Collaboration. Collaboration is essential to the Getty Center's conservation efforts. The Getty Trust itself is built on the collaboration of its four components, the Getty Museum, the GCI, the GRI, and the Getty Foundation, working collectively to meet the Getty Center's mission. A recent initiative by the Getty Trust that involves all four branches is Ancient Worlds Now: A Future for the Past. Launched in 2019, this \$100 million initiative was created to promote a deeper understanding of the world's ancient cultural heritage by calling attention to threats to undermine it and adopting ambitious strategies to conserve what remains (Kenney, 2019). According to James Cuno, the Getty Center felt the need to create this initiative due to a growing recognition in the last two decades of how violent conflict and climate change were threatening the remains of antiquity (Getty Center, 2019/2021; Kenney, 2019). Through exhibitions, conservation research, scholarship, and educational programs, the initiative seeks to create conservation strategies designed to increase scientific expertise and capacity needed to save sites and artifacts, engage global audiences, and raise public awareness of threats to ancient heritage sites (Getty Center, 2019/2021; Philanthropy News Digest, 2019). Due to the COVID-19 pandemic, Cuno and the Board of Trustees have elected to wind down the initiative, though the projects already launched will continue (Getty Center, 2019/2021). Despite this, Ancient Worlds Now: A Future for the Past shows how large an impact the Getty Center can have when all four components collaborate.

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In its mission, the Getty Foundation specifically mentions working collaboratively with the other Getty Programs and promoting the interdisciplinary practice of conservation. Consistent with the Getty Foundation, the GCI has been dedicated to developing an interdisciplinary approach to conservation since its creation, combining science and art history with treatment and bringing together professionals of different specialties to advance the field of conservation (Bridgland, 1995). Today, the GCI is made up of scientists, archaeologists, architects, conservators, planners, and specialists in subjects such as documentation and education. The GCI's effort to incorporate multiple perspectives into its work can be seen across its offerings. For example, each of the GCI's newsletters contain articles by professionals from outside the GCI, who specialize in different fields. The newsletter's name itself, *Conservation Perspectives*, indicates that the GCI is interested in sharing the work of different specialists from across the conservation field. Similarly, in its lectures and panels, such as in the lecture Climate Change and Preserving Cultural Heritage in the 21st Century, the GCI brings together a diverse range of speakers who can each offer a different perspective. Finally, interdisciplinary collaboration can be seen in the GCI's courses. In the MCE's Preserving Collections in the Age of Sustainability course, the GCI not only includes instructors from institutions around the world, but also seeks to gather students from different disciplines so they can learn from each other's diverse experiences (GCI, 2019).

External Collaboration. Much of the GCI's work also includes collaboration with outside partners. Partnerships can be found within courses, such as the GCI's partnership with ICOM and ICCROM for the Teamwork for Integrated Emergency Management course, and lectures, such as Climate Change and Preserving Cultural Heritage in the 21st Century which as organized with the Natural Resources Defense Council. Important also are the GCI's research

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partnerships which occur at the local, national, and international level. For example, the GCI is working with the Eames House and Studio in Los Angeles to understand and assess the current condition of the house, implement conservation measures, and develop a long-term conservation management plan and a maintenance program, while across the world, it is also collaborating with Egypt's Supreme Council of Antiquities (SCA) on a project for the conservation and management of the tomb of Tutankhamen (GCI, 2013; GCI, 2015).

In addition to research, the GCI also collaborates on publications. For instance, from 1999-2002, as a result of the GCI's work on collections environments and preventive care, Getty scientists were a part of the committee that created the chapter for museums, libraries, and archives in the American Society of Heating, Refrigerating, and Air Conditioning Engineers' (ASHRAE) handbook *ASHRAE Fundamentals*, which greatly influenced conservation practices (Dardes & Druzik, 2000; GCI, n.d.-b). Later in 2015, the GCI worked to revise the chapter, suggesting that climate control specifications be based on historical climate averages to which a certain collection and building have been acclimatized (Boersma et al., 2018). These changes can result in environmental strategies that could be easier to achieve with nonmechanical controls at a more affordable cost to the institution, which will be increasingly important as climate change's impact on collection environments grows (Boersma et al., 2018)

Collaboration is also observed in the Getty Center's emergency procedures. In its wildfire prevention, the Getty Center works closely with first responders (Shamberg & Stephan, 2019). Getty staff communicate with firefighters to coordinate their operations, assist in fire prevention techniques, offer the Getty Center as a rest area, and when train with them on an annual basis (Shamberg & Stephan, 2019). Within the Getty Center, multiple departments are involved with

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fire prevention at all times. From research to emergency response, collaboration is critical to all of the Getty Center's activities.

The Newark Museum of Art

Located in Newark, New Jersey, the Newark Museum of Art is the state's largest museum, holding collections of American art, decorative arts, contemporary art, and arts of Asia, Africa, the Americas, and the ancient world. Founded in 1909 by John Cotton Dana, the museum was created to promote the appreciation, understanding, and enjoyment of the arts and sciences (Newark Museum of Art, n.d.). Dana's leadership established the Newark Museum of Art as one of the most progressive cultural institutions in the country (Newark Museum of Art, n.d.).

Institutional Mission, Values, and Policies

Mission. The Newark Museum of Art's (2020) mission states, "We welcome everyone with inclusive experiences that spark curiosity and foster community" (p. 2). While the mission statement does define the museum's unique identity and purpose, provides a distinct focus for the institution, and articulates the museum's understanding of its role and responsibility to the public as required by the AAM (n.d.-d), it does not mention its collection.

Collections Management Policy. Though the Newark Museum of Art's mission statement does not address its collection, the *Collection Management Policy* (2020) does highlight the museum's commitment to collections stewardship. In it, the Newark Museum of Art (2020) "recognizes that its obligation to its collections constitutes a public trust," and its "responsibility towards future generations who are entitled to benefit from the material evidence of human culture and the natural world that the Museum's collections provide" (p. 5). Section 7 is dedicated to Collections Care and begins with the museum reaffirming its ethical duty to care for the collections it holds in the public trust and stating that it is the responsibility of the entire

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staff to help provide the proper environment, security, and the highest standards of care and handling for the collection (Newark Museum of Art, 2020).

The Collections Management Policy (2020) also highlights the ways the museum is properly caring for their collection, including preventive conservation, risk management, conservation, storage, and environment and environmental monitoring. On the use of preventive conservation, the museum states, “This collections care policy is based on the principles of preventive conservation to ensure that the agents of collection deterioration are detected, avoided, blocked, or mitigated if possible,” (Newark Museum of Art, 2020, p. 31). Along with preventive conservation, the collections management policy also mentions conservation. The Newark Museum of Art develops plans for preventive treatment and care for object in consultation with conservators, who also assist in monitoring the objects and the environment (Newark Museum of Art, 2020).

Regarding risk management, the *Collections Management Policy* states that collections are routinely monitored for damage and loss and outlines the responsibility of the Security staff, the Office of the Registrar, and the Exhibitions Department (Newark Museum of Art, 2020). This section also affirms that “the Emergency Preparedness and Response Plan for collections must be followed in all emergencies involving collections,” (Newark Museum of Art, 2020, p. 32). A part of the Newark Museum of Art’s risk management strategy is environment and environmental monitoring. The policy explains that, “Preventive and protective measures are taken and proper materials used to minimize damaging effects of the environment,” and that “monitoring the environment includes recording temperature, relative humidity, light, ultraviolet radiation, and regular building inspections,” (Newark Museum of Art, 2020, p. 33). The museum uses technological systems to ensure appropriate environmental conditions and regularly

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monitors and maintains these systems (Newark Museum of Art, 2020). Finally, the collections management policy addresses the museums storage. Registrars develop and maintain maintenance schedules, environmental checks, and integrated pest management schedules, and work with curators to acquire funds to implement and upgrade storage (Newark Museum of Art, 2020). As required by the AAM (n.d.-a), the Newark Museum of Art's collection management policy thoroughly explains how it cares for its collections using established standards and practices, demonstrating the collections being held safely in the public trust.

Disaster Preparedness and Emergency Response Plan. The Newark Museum of Art's *Emergency Plan*, updated in 2015, adheres to best practices, covering disaster prevention, preparedness, response, and recovery (Dorge & Jones, 1999; Ferraro & Henderson, 2013). It acknowledges the museum has a legal and ethical responsibility to ensure the safety of staff, visitors, and collections held in the public trust (AAM, 2018; Newark Museum of Art, 2015). The plan includes a section on response procedures, which covers evacuation plans and procedures and steps that must be followed in response to specific hazards, and another on staff organization. While climate change is not mentioned in the plan, some of the hazards identified are threats exacerbated by climate change. These include hurricanes/nor'easters, storms, and environmental emergencies, or serious problems with relative humidity, temperature, or air pollution. Important also are the sections on floods and power outages, which may be caused by powerful storms. In identifying and assessing these risks, the Newark Museum of Art will be better equipped to respond when they do occur.

In regard to protecting its collections, the museum follows the principle that "solid collections management procedures, good documentation and emergency preparedness are the primary keys to the safety and security of collections," (Newark Museum of Art, 2015, p. 3).

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However, the *Emergency Plan* acknowledges that there is “a greater responsibility for the lives of their visitors and staff than for the preservation of the museum collections,” (Newark Museum of Art, 2015, p. 4). Prioritizing human lives over the collection is essential to disaster preparedness and emergency response plans (AAM, 2018; Ferraro & Simmons, 2013). The plan’s section on collection emergency response procedures identifies staff in charge of the collections, the steps that should be taken in an emergency, and guidelines for the handling of objects in an emergency situation. These measures will ensure that no additional damage is done to the collection and help facilitate easier recovery.

Education and Training

An important piece of the collections management policy is training. The policy states, “Training and information is provided to all Museum staff on proper care and safety of the collections” (Newark Museum of Art, 2020, p. 30). Training is also an important piece of the museum’s *Emergency Plan*, which states that, “Staff participates in as many emergency training sessions as possible,” (Newark Museum of Art, 2015, p. 3). The plan encourages staff to periodically review their individual roles as well as the overall plan and stresses that “familiarization and training are the keys to success in any emergency situation” (Newark Museum of Art, 2015, p. 58). Staff training will help ensure the long-term, sustainable care of collections.

Collaboration

The message of community contained the Newark Museum of Art’s (2019) mission statement is reflected in its collection stewardship practices. The *Collections Management Policy* asserts that, “Every Trustee and employee of the Museum is entrusted with the preservation and safety of the collections,” (Newark Museum of Art, 2020, p. 30). It goes on to say, “It is the

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responsibility of the entire staff to help provide the proper environment, security, and the highest standards of care and handling for the collection,” (Newark Museum of Art, 2020, p. 30). The board of trustees, director, curators, registrars, conservators, librarians, and exhibition, security, and operations staff are all needed to care for collections. The staff that directly work with collections, such as the registrars and curators, are committed to communicating to other staff the current requirements for accepted standards of collections care, assuring that other staff are kept up to date on best practices of collections care (Newark Museum of Art, 2020). The museum also works closely with outside conservators and consultants, who provide additional assistance and care (Newark Museum of Art, 2020). Through its *Collections Management Policy*, the Newark Museum of Art acknowledges that effective collections care is a collaborative effort.

Collaboration is also key to the Newark Museum of Art’s (2015) *Emergency Plan*. Internally, all members of staff are involved in emergency response. The *Emergency Plan* outlines a chain of command that includes the museum’s director, collections management staff, buildings system and security staff, personnel management staff, and public relations staff. Members of the emergency response team should be aware of each other’s responsibilities, contact information, schedules, and locations (Newark Museum of Art, 2015). The plan stresses that it is extremely important for staff to understand the chain of command to ensure the greatest efficiency (Newark Museum of Art, 2015). Staff outside the organizational chain of command must also be involved with emergency preparedness. The *Emergency Plan* presents steps and guidelines for how Special Programs staff and Education staff should respond to emergencies. The museum also recognizes that it is a member of the wider community and “shall work with community leaders in preparing, implementing, and following a community-wide emergency plan,” (Newark Museum of Art, 2015, p. 3). During emergencies, staff must coordinate with

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Newark officials and first responders (Newark Museum of Art, 2015). For the Newark Museum Art's *Emergency Plan* to be successful, collaboration between museum staff and outside partners is necessary.

Similarities and Differences

Institutional Mission, Values, and Policies

Both museums emphasized collections care within their institutional policies. The collection management policies of the museums begin with statements of the institution's intent to ethically and legally protect and preserve the collections that are held in the public trust. The sections on collections care state the museums' objective to provide safe, secure environments for objects that adhere to the highest standards of care. The Newark Museum of Art's (2020) section on collection care is longer and goes more in depth on certain methods of care, but at the core of both policies is conservation. The collections care practices are guided by the principles of conservation. The Newark Museum of Art (2020) specifically acknowledges preventive conservation in its policy, and though the Getty Museum does not, preventive conservation is an important value to the Getty Center as seen through its research on and dissemination of information about preventive conservation. By prioritizing preventive conservation, the Newark Museum of Art and the Getty Center are affirming the preservation of objects as an essential museum function and demonstrating proper professional conduct (Williams, 1997).

The museums' commitment to preventive conservation is also reflected in their dedication to disaster and emergency preparedness. The Newark Museum of Art's (2015) *Emergency Plan* shows that it has identified and prepared for potential risks, ensuring that it will be able to protect collections against them. The Getty Museum's disaster preparedness and emergency response plan was not able to be obtained, however, the GCI's research, educational

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programs, and publications demonstrate that the Getty Center is dedicated to disaster preparedness. Additionally, the Getty Center's preparation for and response to wildfires shows that it has identified risks to the collection and has an efficient emergency plan in place. None of the museums' policies reference climate change, but their emphasis on preventive conservation and disaster preparedness provides a foundation on which climate change adaptation policies and procedures can be built. The Newark Museum of Art and the Getty Center show that any museum can have thorough policies that highlight its commitment to the preservation and protection of collections.

Research

A distinctive difference between the Getty Center and the Newark Museum of Art is size and scale. As one of the world's richest institutions, the J. Paul Getty Trust operates with a \$7 billion endowment (J. Paul Getty Trust, 2020). With this large amount of financial resources, the Getty Center is able to operate at a scale unattainable by the Newark Museum of Art, maintaining research institutions to support its museum. Through the GCI, the Getty Center can conduct research on important topics like preventive conservation, the collections environment, and disaster preparedness, that other institutions cannot. The Getty Center's foundation of resources also allows it to research climate change impacts. No data was found about research conducted by the Newark Museum of Art on preventive conservation, the collections environment, and disaster preparedness, which limits a more thorough comparative analysis.

Education and Training

The Newark Museum of Art and the Getty Center understand the importance of staff training. In its *Collections Management Policy and Emergency Plan*, the Newark Museum of Art (2020, 2015) states that staff will be trained in collections care practices and emergency

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procedures. Similarly, the Getty Center's staff regularly trains with the city's fire department annually (Cummins, 2018; Shulka, 2019). While both museums highlight the importance of staff training, the Getty Center is able to expand its educational practices to other professionals and the public and to disseminate its research for the benefit of the wider museum and conservation field through its publications, courses, lectures, and workshops on topics like preventive conservation and disaster preparedness.

Physical Prevention

The Getty Center's financial resources also allow it to invest in physical preventive measures that are unattainable for other museums like the Newark Museum of Art. Designed and built by Richard Meier & Partners Architects, the Getty Center's buildings and campus, with their extensive fire prevention systems, cost over \$700 million (Cummins, 2018). No information was found on the Newark Museum of Art's physical prevention measures.

Collaboration

The Newark Museum of Art and the Getty Center highlight the importance of internal and external collaboration. In their collections management policies, the Newark Museum of Art (2020) and the Getty Center (2019) recognize that all staff members are necessary for effective collections stewardship. In the Getty Center, all four branches support each other and come together to create initiatives that promote the wider mission of the Getty Center. Regarding disaster planning, the museums include multiple departments in emergency planning and response procedures and encourage staff to understand how their role fits into the wider plan. Externally, the museums work with local first responders to ensure the success of their emergency plans. The Getty Center's reputation and resources allow external collaboration on a larger scale. It is able to partner with influential international and national organizations and

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work with professionals from around the world. Through collaboration, the Newark Museum of Art and the Getty Center demonstrate that the protection of collections requires efforts and knowledge of museum staff and outside partners.

Summary

This chapter provided a thematic interpretation of the research project's comparative case study and textual and content analyses. The analysis and comparison of the Getty Center and Newark Museum of Art revealed five themes as ways in which museums can protect their collections from climate change risks: 1) institutional mission, values, and policies, 2) research, 3) education and training, 4) physical prevention, and 5) collaboration. The data's findings and thematic interpretations sought to answer the research question:

RQ: How can museums create disaster risk management and climate change adaptation strategies to better protect collections against increasing climate change risks?

Chapter 5 presents a series of recommendations based on the research project's findings and the review of scholarly literature designed to aid museum professionals in creating climate change adaptation strategies. The chapter will also include the strengths and limitations of the research project and of potential directions for future research.

Chapter 5:

Conclusion

Introduction

Museums are established as trusted guardians of society's tangible and intangible cultural heritage. Acting in the public trust, museums have an ethical responsibility to identify and protect their collection from physical risks (AAM, 2000; Bauer Kilgo, 2020; ICOM, 2017). One growing threat museums must address is climate change, which will cause severe and irreversible impacts to human and natural systems if greenhouse gas emissions continue (IPCC, 2014a, b). The increased frequency and intensity of rainfall, flooding, wildfires, and temperature fluctuations caused by climate change will harm museum collections (Cassar, 2005; Markham et al., 2016;). As a part of their ethical duty, museums must adopt strategies that will protect their collections from increasing climate change risks.

In Chapter 2, a review of the literature explored the following themes: the intersection of climate change and cultural heritage, the values of cultural heritage, museum collections care, risk and cultural heritage, and climate change adaptation. The literature revealed that museums must adopt disaster risk management and climate change adaptation strategies in order to ensure the continued preservation of cultural heritage and the social and economic value they offer. However, a gap in the literature was identified regarding the impact of climate change on museum collections specifically. The museum field lacks accessible and replicable climate change adaptation strategies. In response to this gap in the literature, the research project sought to answer the research question:

RQ: How can museums create disaster risk management and climate change adaptation strategies to better protect collections against increasing climate change risks?

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As illustrated in Chapter 3, a comparative case study of two AAM accredited art museums, the Getty Center and the Newark Museum of Art, was conducted to answer this question. In addition, content and textual analyses were performed on professional and popular press literature by and about the institutions. The systematic, rigorous data collection, coding, and analysis processes revealed five ways these museums are addressing climate change risks, presented in Chapter 4. The five themes are 1) institutional mission, values, and policies, 2) research, 3) education and training, 4) physical prevention, and 5) collaboration.

Based on these thematic findings and the literature review, this chapter includes a discussion of the key themes and a series of recommendations and best practices for museum professionals to utilize in the creation of climate change adaptation strategies. The chapter will also examine the project's strengths and limitations and provide suggestions for future research. To conclude, the chapter presents a closing discussion of the research question and of the research project's impact on the field.

Discussion

A review of the scholarly literature on museums and climate change revealed that there is a gap regarding museum collections care practices and climate change response. More specifically, the museum field lacks accepted frameworks and best practices for the implementation of climate change adaptation strategies. To fill this gap, the researcher conducted a qualitative comparative case study and content and textual analyses of two museums, the Getty Center and the Newark Museum of Art, to gain insight into ways museums can respond to climate change risks. From the data analysis process, five key themes emerged 1) institutional mission, values, and policies, 2) research, 3) education and training, 4) physical prevention, and 5) collaboration.

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Institutional Mission, Values, and Policies

The Getty Center and Newark Museum of Art show the importance of thorough institutional policies that address conservation and disaster risks. While the Getty Center and Newark Museum of Art did not explicitly address climate change in their collection management policies or disaster response and emergency preparedness plans, these documents did provide a solid foundation on which the museums' conservation practices are built. In the face of increasing climate risks, disaster preparedness and emergency response plans are critical because they help a museum assess, manage, and reduce risk and recover from natural and manmade disasters (AAM, 2018; Cassar, 2005; Cato, 2020; Jigyasu, 2020; Mínguez García, 2020). Additionally, disaster preparedness and emergency response plans help museums “build back better” when disasters do strike (Mínguez García, 2020).

Research

Researching and the accumulation of knowledge about preventive conservation practices and climate change and its effects on collections can help museums better prepare for increasing risks. The Getty Center's extensive published research about museum climates, preventive conservation, and disaster preparedness not only influences its own practices, but also helps other museums. Much of the Getty Center's research focused on risk assessment, or the process of identifying, analyzing, and evaluating potential risks that aids in creating informed predictions about the probability of unwanted events (Forino et al., 2016; Papathoma-Köhle et al., 2016). The Getty Center works to identify and mitigate risks to collections, creating more effective, sustainable collections care practices. Since there is a high level of uncertainty surrounding climate change, continued climate change assessment and monitoring will increase the amount of

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data and understanding of the relationship between climate change and cultural heritage (Cassar, 2005).

Education and Training

The Getty Center and the Newark Museum of Art show the importance of education and training, using classes and training sessions to educate internal staff and external partners. Training and multi-level workshops are needed so experts can transfer technical knowledge and skills to museum professionals and vice versa (Fatorić & Seekamp, 2017). Training staff in emergency response procedures is particularly important and necessary as disasters become more frequent.

In addition to staff, it is necessary to educate outside stakeholders and policy makers on the effects of climate change on cultural heritage and the importance of adaptation strategies (Cassar, 2005; Cassar, 2009; Fatorić & Seekamp, 2017; Jigyasu, 2020; O'Brien et al., 2015; Sabbioni et al., 2010). Local communities provide valuable input into adaptation planning, but first, it is essential for the public to be made aware of the effect climate change has on cultural heritage (Cassar, 2005). Similarly, policymakers may not always be aware of the impacts climate change has on cultural heritage, thus, if cultural heritage is to be incorporated into any governmental policy, officials need to be educated on these impacts (Cassar, 2009). Without educating individuals across all levels about climate change and cultural heritage, the creation and implementation of effective adaptation strategies will not be possible.

Physical Prevention

The Getty wildfires demonstrate how important it is to invest in physical prevention strategies. Adopting appropriate physical rehabilitation and maintenance practices are essential to the protection of collections, even if they are just short-term solutions (Cassar, 2005; Coelho

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et al., 2020; Heathcote et al., 2017; Mínguez García, 2020). The Getty Center was able to afford state of the art fire prevention systems, but even low-risk solutions such as weather-proofing buildings or applying passive retrofit measures offer valuable protection (Coelho et al., 2020; Heathcote et al., 2017). Though maintenance and other mitigation measures may only be useful for a short time, they can be valuable preventive care practices that avoid chronic problems and are essential for the long-term conservation of cultural heritage.

Collaboration

Essential to both the Getty Center and Newark Museum of Art's practices was collaboration. Each highlighted the importance of internal collaboration in collections care practices and procedures as well as external collaboration, especially regarding emergency response. Both museums worked closely with local first responders, but coordination between cultural heritage experts and response teams should also occur at the national level (Cassar, 2005; Mínguez García, 2020;). The Getty Center also recognizes the need to work with international partners. As museums continue to respond to climate change, they should involve outside agencies, communities, governments, and individuals (Cassar, 2005; Fatorić & Seekamp, 2017; Jigyasu, 2020). Successful adaptation strategies will require decision-making across multiple levels (Fatorić & Seekamp, 2017).

Recommendations

The thematic findings were integrated with the literature review to produce a series of recommendations that can aid museum professionals in the creation of climate change adaptation strategies.

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Institutional Mission, Values, and Policies

It is important for museums to acknowledge their commitment to protecting collections from climate change risks in their institutional policies. Museums should consider adding a section about climate change risks to their disaster response and emergency preparedness plans. The disaster preparedness and emergency response plan would be an ideal place to put this information because they contain information on potential disaster risks. Since climate change is known to increase the likelihood of disasters, climate change should be included as one of the potential threats to the museum. Each museum must adapt their climate change section based on their unique resources and risks. For example, the Newark Museum of Art's Emergency Plan contained information about risks relevant to their geographic location, such as hurricanes and winter storms, while another museum may be affected by different disasters.

Research

The Getty Center is fortunate to have the resources to engage in thorough, extensive research on collection climates, but other museums can emulate this practice, albeit at a smaller scale. Museums should engage in short- and long-term risk assessments. If registrars, collections managers, and conservators continually monitor and document their collection, they can gain a better understanding of how it will react in response to a changing climate. It is also important for museum professionals to remain updated on climate science to learn about how climate change will affect their geographic areas and on the growing scholarly research about climate change impacts on museum collections.

Education and Training

Museums should invest in educational opportunities for their staff. Training courses in emergency preparedness will help the staff be better prepared to respond to disasters. Informing

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staff about climate change and its risks will also increase emergency preparedness and contribute to creation and implementation of adaptation strategies. In addition to staff training, it is suggested that museums educate outside stakeholders and policy makers on the effects of climate change on collections. Whether through an educational online resource or special professional course, increasing awareness about climate change risks to museum collections will help to influence future adaptation strategies.

Physical Prevention

The Getty Center's multi-million fire prevention systems are unattainable by most museums; however, all museums should consider implementing physical prevention measures. Each museum can identify relevant risks to their collections based on their location and apply physical prevention measures that will fit into their budget.

Collaboration

Museums must collaborate with others to ensure the success of climate change adaptation strategies. Like the Getty Center and Newark Museum of Art, museums should work with local first responders to create and carry out emergency plans. They can also look to join national and international organizations dedicated to preserving collections. Building relationships with and learning from other museums will help inform climate adaptation strategies and build field-wide unity. Additionally, museums should encourage coordination between all staff regarding internal conservation and emergency practices. Any climate adaptation strategy must acknowledge the perspectives of others and outline ways in which the museum will coordinate adaptation efforts internally and at the local, national, and international level.

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Strengths and Limitations

This qualitative research project has several strengths and limitations. The research question was grounded in a thorough review of the scholarly literature and was formed in response to a gap regarding the lack of climate change adaptation plans in museums. This gap informed the project's methodology. The qualitative comparative case study, textual analysis, and content analysis conducted allowed for systematic and detailed data collection and analysis processes. Data was collected from multiple sources and went through a rigorous analysis process to determine relationship between museum practices and policies and climate change risks. Data about the Getty Center's practices were widely available. The findings were further analyzed through the triangulation of data. Ultimately, the research project's methodology ensured that data was collected and analyzed in a reliable way, resulting in valid thematic interpretations.

The research project also presented a number of limitations. First, case studies and textual and content analyses are time-consuming processes that require extensive sampling, coding, and comparison. Therefore, due to the time restrictions of this project, only a limited number of documents were collected and analyzed and only two cases were chosen. In addition, data regarding the Newark Museum of Art and climate change response was difficult to find, further limiting the findings. Next, content and textual analyses are subjective and can be interpreted in multiple ways. As a result, the findings presented in this project reflect only one potential interpretation and were influenced by the researcher's personal background, values, and biases. Lastly, the research project only examined two unique museums that have their own specific resources and contexts, which influenced the types and amount of data found. Other cases may have presented a different set of themes. Together these limitations reduce the research project's

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generalizability. Despite the limitations, the research project sought to contribute to the scholarly literature about museum collections care and climate change and to open the conversation on how museum professionals can respond and adapt to climate change risks in ways that will ensure the continued protection of collections.

Directions for Future Research

As previously described, this research project sought to identify best practices and strategies that can help museum professionals create and implement climate change adaptation strategies. The museum field currently lacks replicable climate change adaptation strategies thus a comparative case study and textual and content analyses were conducted to address this gap in the research concerning collections care and climate change. However, as climate change threats increase, more research is needed on how museums should respond and adapt to these risks. Such research would provide insight into how climate change risks will affect museum collections and what museums can do to better protect their collections from these risks.

There is current research on cultural heritage and climate change, which can be applied to museums, but for findings that take into consideration the field's legal and ethical standards, future research must focus on museums specifically. Research would benefit from additional case studies of museums that are actively responding to climate change threats. There are many museums of different types and sizes doing important work on climate change adaptation. It is also important to analyze other museums since climate change risks differ depending on geographic region. Additionally, future research should include semi-structured interviews from museum professionals involved in designing and implementing adaptation strategies to gain insight into what it takes to put these strategies into action in real-world situations. Future research projects are encouraged to generalize findings so they can be applied to a wide range of

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museums. To keep research relevant, museum professionals should stay updated on current climate science. Overall, research on the impacts of climate change on museum collections is new and growing, but more research is needed to continue the dialogue around collection care and climate change risks, to influence museum practice, and to implement field-wide adaptation strategies.

Conclusion

This research project sought to understand how museums should respond to increasing climate change risks in order to better protect their collections. In response to a gap in the scholarly literature the following research question was formed:

RQ: How can museums create disaster risk management and climate change adaptation strategies to better protect collections against increasing climate change risks?

To answer this question, a qualitative comparative case study was conducted to compare the climate change responses of the Getty Center and Newark Museum of Art and textual and content analyses were used to examine professional and popular press texts from the two institutions. From the data collection and analysis processes, five themes emerged as ways museums can respond to climate change risks: 1) institutional mission, values, and policies, 2) research, 3) education and training, 4) physical prevention, and 5) collaboration. A discussion of the findings was integrated with the literature review to create a series of recommendations that can guide museum professionals in the creation and implementation of climate adaptation strategies.

Overall, this research project aimed to provide a better understanding of how museums can protect their collections against climate change risks. As climate change continues to worsen,

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it is important for museums to understand potential threats and prepare appropriately. Since the museum field currently lacks field-wide climate change adaptation plans, the recommendations produced by this project can fill this gap and contribute to the formation of accepted best practices. Additionally, the research project continues the conversation about the necessity for museums to respond to climate change risks. In conclusion, the findings of this research project encourage museums to seriously consider the increasing climate change risks and to adopt strategies that will protect collections for the benefit of future generations.

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