

Benedetta Centofanti

Student Number: 696974

Supervisor: Valeria Morea

Erasmus School of History, Culture and Communication

Erasmus University Rotterdam

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## “Preserving Europe's Cultural Heritage: Strategies and Challenges in the Face of Climate Change”

**Abstract:** This research examines policies and strategies in mitigating the effects of climate change on cultural heritage sites. It highlights the pressing necessity for a paradigm shift toward new conservation and restoration measures. This research has extensively reviewed the literature to identify gaps in knowledge and has employed a theoretical framework that incorporates safeguarding strategies, and European cultural policies for climate change. The thesis employed a qualitative content analysis, in which data were collected from 13 carefully selected policy documents that consider the impacts of climate change on cultural heritage. Indeed, the primary research question investigates the objectives of European policies and what strategies have been implemented to address and solve the issue of protecting cultural heritage from the effects of climate change. The results show that, although commitment and attention to this problem has increased during the years, there is still a large gap of clear recommendations and strategies at European level. Results were divided according to similarities and differences between the policies, such as similar interventions or actions, lack of focus over the years and underlying topic. This was done by maintaining a chronological order of policy publications. Indeed, the chronological framework is of great importance to address the study topic of measures implemented at European level. Implicit in the research is the acknowledgement that cultural heritage is not solely an innocent bystander but an engaged participant in discussions regarding environmental sustainability. The thesis adds to the intricate understanding of the correlation between climate change and cultural heritage preservation by providing valuable insights into both dimensions, environmental and cultural, hoping to bring greater awareness and discourse on the topic. Through a policy content analysis, the research aims to provide detailed perspectives on strategies implemented to combat change at the European level, as the European Union is seen as a key centre of influence because of its inherent power and ability to make a significant impact. The conclusion also highlights the need to use technology and scientific advances to safeguard cultural heritage in the context of climate change. The ultimate goal of this research is to encourage individuals, politicians and communities to address this important issue.

**Keywords:** Climate change, cultural heritage, cultural policies, Europe, strategies

**Word count:** 13379

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## 1. Introduction

Climate change is threatening cultural heritage like never before, the unique historical and artistic treasures around the world are now facing severe risks. It is time to include culture and heritage in environmental sustainability, this will entail a strategic shift towards investing in new forms of conservation and restoration. This problem has been ignored for too long, and it is now in danger of being too late for some archaeological sites, such as the city of Abae in the state of Phocis, Greece, and Villa Giulia in Ventotene, Italy. As a result of severe storms, sea level rise and fires, some of this heritage will not be enjoyed by the next generation (Imam, 2023).

An evident example is the city of Venice, Italy, which faces the imminent threat of submersion due to the combined impact of global warming, land subsidence, and the rise in sea levels. The Venetian lagoon system is facing a crisis due to sea-level rise, erosion, pollution, fisher activity and wave motion (Deheyn et al. 2007). The monuments in Venice exist in a highly vulnerable setting where the rising sea levels and storm surges pose significant threats. These challenges not only affect the preservation of monuments, but also their safety and survival. The understanding of the sea level trend in Venice remains incomplete despite its importance for the city. Venice and the lagoon are likely to face multiple hazardous situations in the near future that will pose threats to various aspects such as the environment, society/economy, and buildings/monuments (Borg et al. 2014).

Global awareness of the need for natural and socio-economic systems to mitigate the impacts of climate change through climate adaptation processes has been steadily increasing (Fatorić & Daly, 2023). While the scientific community recognises the importance of climate adaptation measures for both tangible and intangible cultural heritage, there is limited evidence that the cultural heritage sector has actually adapted to climate change (Fatorić & Daly, 2023). Although cultural heritage is often recognised at a strategic level in climate adaptation planning, there is a notable lack of practical implementation through the creation and implementation of specific policies, including monitoring (Guzman & Daly, 2021). The issue needs to be clarified and serious steps need to be taken to move from a systematic approach to mitigating the damage of climate change to effective solutions. What policies at European level have been implemented and what has been effective so far? Adaptable solutions to the various problems caused by climate change must be found, but before the damage is done, not after. The motivation of this research stems from a deep concern for the tangible expressions of human history and creativity facing an unprecedented existential threat. The urgency is underlined by the tangible risk of irreversible loss. By addressing the intersection between environmental sustainability

and heritage conservation I aim to contribute to the practical toolkit of policymakers, heritage managers and conservationists. The relevance of this research is dictated by the urgency to furnish risk management tactics for addressing the repercussions of potential disasters in the context of safeguarding Cultural Heritage (De Masi & Porrini, 2019). The societal relevance of this research lies in its potential to inform actionable strategies that can safeguard our shared cultural legacy.

This research is structured in five chapters, the following one presents the theoretical framework on the relevant literature, which serves as an initial understanding of the subsequent results. Therefore, the concept of cultural heritage will be defined, European policies and the effects of climate change will also be discussed. The third section describes the methodology used for the research, which includes a qualitative content analysis of policy documents, and defines how the data was collected and analysed. Finally, the results are presented, which include 13 policy documents that were critically reviewed based on the literature studied.

## **2. Theoretical framework**

### **2.1. Definition of cultural heritage**

The term “cultural heritage” does not have a universally accepted definition. According to Benhamou (2013), “heritage is a social construction where boundaries are unstable and blurred”. Heritage is often considered to be obtained or inherited from the past, as its name implies. However, it can also be obtained from recent history or even within the present generation. When referring to “cultural heritage”, it is implied that the object being discussed has cultural significance or meaning. In recent years, the socio-economic importance of cultural heritage has been widely recognised (Rizzo & Mignosa, 2013). This led to the significant growth of the UNESCO World Heritage List (WHL), in less than 50 years, currently including 1199 globally recognized sites. The complex nature of cultural heritage values has resulted in numerous definitions:

The International Council on Monuments and Sites (ICOMOS) created a paper that outlines over 60 different definitions of cultural heritage, with differences based on the institution, historical context, and country. Here is a basic definition of heritage to begin with. The Cambridge (2018)

lexicon defines heritage as characteristics of a society's culture, such as traditions, languages, or buildings, created in the past and that continue to hold historical significance.

Article 1 of the World Heritage Convention provides a definition of cultural heritage as:

- Monuments: architectural works, monumental sculptures, paintings, archaeological elements, inscriptions, and cave dwellings that hold exceptional universal value in terms of history, art, or science.
- Groups of buildings: clusters of individual or interconnected buildings that, due to their architecture, coherence, or location, hold exceptional universal value in terms of history, art or science.
- Sites: can be either man-made or a combination of natural and artificial elements, including archaeological sites that hold exceptional historical, artistic, ethnological, or anthropological significance. Some properties may meet multiple categories, such as being both a monument and a complex of buildings.

The definition was formulated in 1972 and the understanding of cultural heritage has changed since then. However, the phrase has been widely defined to include the diverse cultural heritage. Nevertheless, the diversity in local public policies and ambiguity in international rules, which are essential for effectively managing cultural heritage, provide challenges when researching it.

Cultural heritage is considered by many authors as a good that possess both cultural and economic value. In this regard, Throsby (2010) argues that economic value is linked to individuals' heritage experiences, which can be gained through direct consumption, such as purchasing a ticket to visit a heritage site. However, individuals can benefit from cultural heritage through positive externalities, which are the favourable side effects that heritage can have on their surroundings, even if they did not contribute to its creation or preservation (Benhamou, 2011). Throsby (1997) emphasises several values of heritage, including social, historical, cultural, symbolic, national identity-focused, and economic. Heritage values are interpreted in relation to specific social group, leading to different definitions in different civilizations. Consequently, as society continues to evolve, so does the concept of cultural heritage.

Cultural heritage can be divided into two categories: tangible cultural heritage and intangible cultural heritage. Tangible cultural heritage is viewed as a cultural artwork of historical, artistic, and scientific significance. It includes ancient architecture, archaeological sites, carved stones and so on. Intangible cultural heritage includes traditional cultural manifestations, can be defined as an intangible entity that is intricately connected to human

existence, such as traditions, rituals and festivals, traditional performing arts, and traditional arts and crafts are all included.

The positive externalities of cultural heritage include promoting national unity, enhancing respect for other cultures, fostering cultural diversity, and imparting creative, artistic, and ethical values to present to future generations. Furthermore, national cultural plays a crucial role in enriching people's lives through its aesthetic values (Lixinski, 2013). Therefore, the positive externalities and spill over benefits alone justify strong government intervention to protect, conserve, safeguard, and promote it. The loss of cultural heritage can result in the loss of both the cultural asset itself and the cultural identity of the society that holds it, if the heritage is not protected (Lenzerini, 2011). The prospect of loss is a significant motivator for policymakers and governments in their efforts to preserve cultural assets, especially in the context of tangible cultural heritage. Indeed, the main driver of public engagement is the recognition of cultural heritage as merit goods, similar to other cultural products (Rizzo & Mignosa, 2013). In this context, it is important to define cultural policies as the comprehensive range of strategies implemented by any government in relation to the arts, liberal arts, and heritage. These policies encompass all governmental actions and plans that pertain to the development, dissemination, commercialization, and utilization of culture (Mulcahy, 2006).

### **2.1.1. Cultural heritage threatened by climate change**

The severity of climate change scenarios and socio-economic conditions influence the extent of climate change impacts in Europe. The Paris Agreement aims to keep the global temperature increase below 2°C above pre-industrial levels, with a maximum target of 1.5°C. However, the fact that the global average surface is now one degree Celsius above pre-industrial levels makes it difficult to meet these targets. The Paris Agreement's target of a global average temperature of 3.2-5.4 °C by 2100 could be exceeded if emissions continue at current rates. Estimates suggest that current pledges to reduce emissions will be insufficient to meet these targets, with an average increase of 2.6-3.1 °C by 2100. This situation is worsened by the fact that the World Heritage Convention faces challenges in formulating a universally accepted climate change policy at the global level due to the divergent political positions of its member Parties (Daly, 2022). Furthermore, given the urgent need to meet the goals of the UNFCCC Paris Agreement, it is imperative to recognise the significant role that diverse cultural heritage plays in efforts to mitigate climate change. The cultural heritage sector is beginning to recognise the importance

of transformative change, as evidenced by the draft policy paper on Climate Action for World Heritage Sites (WHS; UNESCO, 2021).

On the European Heritage Days 2022, which focused on sustainability, the European Commission published a report on the vulnerability of cultural heritage to climate change, caused by direct and indirect threats, including heavy precipitation, heat waves, droughts, strong winds and rising sea levels. For instance, changes in wind velocity and orientation, together with sudden bursts of wind during storms, have the potential to inflict harm to historical buildings and archaeological sites, causing their collapse. This can impact the movement of salts and lead to discoloration of the walls in historical structures, as observed in Norway, where salt crystallisation causes efflorescence (Sesana et al. 2021). In Romania, a study conducted by Mosoarca et al. (2017) made predictions about the potential harm to historical assets caused by wind-driven rain (WDR), especially when combined with hailstorms. Similarly, Nik et al. (2015) anticipated that WDR would result in increased moisture accumulation in the walls of buildings in Sweden. Furthermore, the report underlines the importance of aligning the strategies of different ministries responsible for cultural heritage and climate change policies at national level, since a challenge is the lack of coherent methodologies for obtaining reliable information and quantitative data. There is a need to integrate culture and cultural heritage into environmental sustainability and climate change policies at all levels. A European climate change risk map for cultural heritage could be utilised to monitor heritage that is at risk (EC, 2023). Many heritage sites are situated along the coast or near sea level, making them vulnerable to marine flooding because of climate change. Sea level rise poses a significant threat to the conservation of cultural heritage monuments situated along coastal areas, such as those in the Mediterranean basin. The archaeological and historical sites built in the coastal areas of this region are facing significant risks due to coastal retreat, erosion, and storm surges. The Pyrigi heritage site is situated on the northern shore of Latium, between the villages of Santa Severa and Cerveteri, also near Rome. The region includes the Castle of Santa Severa, which, together with Pyrigi, is among the most significant cultural sites of the Tyrrhenian region. In the last two century instrumental and empirical data have been collected to demonstrates an increasingly rapid rising of global sea level. This rise would enhance the effects caused by various hazards such as storm surges, flooding, coastal erosion, and tsunamis on infrastructure and building stability, human safety, economic resources, and cultural heritage. This is especially true for the Mediterranean region, where ancient civilizations were born and flourished along its coastlines (Anzidei et al. 2020).



Climate change poses a significant threat also to indoor cultural heritage, particularly in old, leaky buildings without modern HVAC systems – heating, ventilation and air conditioning. A study carried out in Vestfold, Norway focuses on wooden artefacts located in a historic wooden building and how these are at risk due to the changing environmental conditions caused by climate change. This could exacerbate their degradation through biological processes, such as mould and insect infestation, mechanical processes, mainly caused by humidity, and chemical processes, when wood cellulose deteriorates due to higher temperatures and humidity levels (Choidis et al. 2022).

Fortunately, the concept of heritage has become more important in the agendas of political players, the involvement in land development and administration has increased, partly due to transnational projects that have expanded across Europe's territory. Recent initiatives such as the Triquetra Project, as reported by The Art Newspaper (2023), are currently evaluating the impact of climate change on cultural heritage as part of a comprehensive EU initiative. Over a three-year period, the project aims to develop protective strategies for various sites, ranging from prehistoric dwellings in Germany to an underwater ancient city in Greece. The initiative seeks to offer tailored solutions to heritage experts after its completion, since climate change poses an unprecedented threat to cultural heritage.

### **2.1.2. Safeguarding's' strategies**

Safeguarding, is defined in the Article 2.3 of the UNESCO 2003 Convention for the Safeguarding of the Intangible Cultural Heritage, as a measures taken to ensure the sustainability of cultural heritage. These measures involve identifying, documenting, researching, preserving, protecting, promoting, enhancing, transmitting, particularly through formal and non-formal education, and revitalising various aspects of such heritage (UNESCO, 2010).

It is important to distinguish between two important concepts in cultural heritage management: climate change adaptation and disaster risk reduction. Climate change adaptation deals with changing climate patterns and their impact on the environment, while disaster risk reduction focuses on immediate events, exposures, and impacts (Jigyasu, 2019). Integrating climate adaptation and disaster risk reduction initiatives can be challenging due to a lack of coordination between them. Since the first one is focused on environmental sciences, addressing changing climatic patterns and their relationship to the environment, whereas disaster risk reduction has a traditional focus on events, exposures, and immediate impacts. Disaster risk reduction plans ought to integrate methods for decreasing people's susceptibility

to climate hazards through development, risk mitigation, and early warning systems. Jigyasu further suggests that climate risk reduction could leverage tools obtained within disaster risk reduction, including vulnerability assessments and risk monitoring. The Scottish Government is currently working on this, with the Scottish National Coastal Change Assessment, which aims to map the changes in shorelines over time and identify areas that are at risk of erosion due to climate impacts. This assessment is being carried out in response to the potential severe effects of climate change on coasts. Furthermore, several sections of the coastline have undergone the development of non-statutory Shoreline Management Plans (SMPs). These plans evaluate the potential risks and propose management strategies based on the susceptibility and significance of heritage at risk. Choices include building coastal fortifications, or determining that no proactive involvement is required (Dawson et al., 2018).

Indeed, the transition from a reactive to a proactive approach in developing cultural heritage adaptation strategies to climate change is necessary (Sesana et al., 2018). Both the adaptation of cultural heritage to climate change risks and the reduction of carbon footprints of heritage buildings through climate change mitigation are recommended by UNESCO and are complementary strategies. The Intergovernmental Panel on Climate Change defines four key categories of adaptation measures for cultural heritage impacted by climate change: technological, behavioural, managerial, and policy. Technological measures involve physical interventions, such as the mobile gates that safeguard Venice against coastal flooding. Behavioural measures incorporate changes in the conduct of tourists and locals in protected areas, whilst managerial measures involve site monitoring and upkeep. Policy measures comprise of regulations, guidelines, and funding. Furthermore, technical abbreviations will be thoroughly defined in their initial usage. Managerial and decision-making adaptations comprise financial resources, stakeholder engagement, knowledge dissemination, guidelines, regulations, monitoring, inclusion of climate change in management plans, mitigation strategies, and preserving values. Practical adaptations encompass constructing coastal defences, roofs, and shelters, improving drainage systems, relocating heritage sites, avoiding maladaptation, improving monitoring, and digitally recording cultural heritage.

The three pillars of climate change adjustment related to heritage are adaptation, mitigation, and communication. The first one requires identifying options and testing them across various scenarios, citing innovative approaches using traditional ecological knowledge (TEK) and traditional resource and environmental management (TREM) techniques. Mitigation focuses on reducing greenhouse gas emissions with organizations such as the World Monuments Fund (WMF) and ICCROM that are involved in discussing and implementing carbon

mitigation strategies, especially in historic buildings and landscapes. Lastly is fundamental the communication, organizations have to share knowledge like PARIS and Weather-Beaten Archaeology which are engaged in knowledge sharing through conferences. Also, programs such as SCAPE in Scotland and various initiatives in the UK, Ireland, and Canada help monitoring and protecting cultural heritage sites (Hambrecht & Rockman, 2017).

### **2.3. Cultural policies in Europe**

The growing focus on cultural policy in recent decades is reflected in the increasing amount of academic research on the subject. Cultural policies are now recognised as effective tools not only for providing financial support to culture, but also for efficiently allocating resources within this sector to achieve specific objectives. Although there may be ongoing debates among scholars regarding the involvement of the public sector in the cultural sector, it is widely recognized that the provision of heritage relies heavily on public finances in many countries (Blaug, 2001). This statement serves as a crucial background for the entire research, which specifically focuses on European cultural policy related to heritage.

Prior to 1992, cultural policy was exclusively the responsibility of member states until a provision on cultural policy was added to European primary law, marking the first time in the history of European integration. Following its meeting in Copenhagen in 1973, the European Council issued a communiqué stressing the importance of culture and cultural identity in promoting greater integration at European level. In 1974, the European Parliament adopted a resolution calling for the preservation of common cultural heritage. Indeed, the resolution covered a wide range of issues, including the protection of works of art and cultural monuments, the approximation of copyright laws and the harmonisation of cultural tax rules. In January 1976, the European Commission submitted a document to the Parliament outlining the need for coordination of cultural initiatives, and at the end of 1977, the Commission published a document focusing on the impact of current measures on the cultural sector. These measures included regulations to support the free movement of goods, tax regulations and copyright laws. The document also proposed future measures, with particular emphasis on the preservation of the architectural heritage and the promotion of cultural exchanges (Obuljen, 2004). In 1976 and 1979, the European Parliament adopted two resolutions inviting the Commission to submit formal proposals on the treatment of culture within the Community. The European Parliament has always been a prominent advocate of culture at European level. The first conference of EC Ministers of Culture was held in 1982 and a declaration was adopted. This

declaration was subsequently signed in Stuttgart in 1983 (Kaufman and Raunig, 2002). In 1987, the European Ministers of Culture formally established the Council of Ministers of Culture and the ad hoc Commission for Cultural Affairs, marking an important milestone. The European Parliament also approved another important document, the initiation of cultural activities in the European Commission. Article 128 of the Treaty of Maastricht, which later became Article 151 in the Treaty of Amsterdam, was the first article to deal specifically with culture. This was in 1992. The article stresses the need for Member States to contribute to the development and enrichment of their respective cultures, while promoting respect for diversity. It also encourages cooperation between Member States and supports and promotes their initiatives. It also seeks to establish cooperation with other countries. The article also stipulates that the Community must take cultural matters into account in all its actions under other articles of the Treaty and that all decisions concerning culture must be taken unanimously. In 1996 and 1997, three new initiatives were launched to provide financial support for cultural activities. These initiatives were called Kaléidoscope, Ariane and Raphaël. In addition, a new comprehensive programme called MEDIA II was created (Obuljen, 2004).

After the Treaty of Amsterdam, these initiatives were combined and rebranded as “Culture 2000”, the project ran until 2006 and had a budget of 236.4 million euros. The main objective was to promote the growth of a common cultural environment characterised by its diverse and shared cultural heritage. The aim of the programme was to promote a shared cultural environment throughout Europe, celebrating and safeguarding its diverse cultural heritage (European Commission). In order to achieve this objective, the Culture 2000 programme carefully distributed its financial resources to support collaborative creative activities across different artistic and cultural sectors. These included various disciplines such as the performing arts, plastic/visual arts, literature, heritage and cultural history. The aim of the programme was to allocate funds to these sectors in order to promote cross-border cultural interaction, foster artistic creativity and strengthen mutual understanding and appreciation between European nations.

On 14 July 2004 the Commission published its proposal for a new programme to replace Culture 2000. The new Culture Programme (2007-2013) entered into force on 28 December 2006. The main objective of the programme, as stated in the decision, is to strengthen the cultural area shared by European, rooted in a common cultural heritage. This is to be achieved by encouraging cultural cooperation between creators, cultural operators, and cultural institutions from the participating countries. In addition, the plan outlines three other specific

objectives: to increase the mobility of artists and other cultural workers, to facilitate the circulation of works of art, and to promote intercultural dialogue and exchange (Langen, 2010).

In 2008, the “Work Plan for Culture” was drawn up every three years by the Cultural Affairs Committee of the Council of the European Union, starting from 2008-2010. The Work Plan focuses on five major areas: improving the conditions for the movement of artists and other professionals in the cultural domain; Facilitating access to culture, by promoting cultural heritage, multilingualism, digitations; Enhancing the development of data, statistics, and procedures in the cultural sector to improve comparability; Enhance the capacity of cultural and creative sectors; Advancing and implementing the UNESCO Convention on the Safeguarding and Promotion of the Diversity of Cultural Expressions. The consecutive Work Plan for Culture demonstrate a consistent dedication to organized involvement in the execution of cultural policies. The current version covers the years 2023-2026 (Yasuda, 2023).

The latest updates relate to the priorities set by the European Commission for the period 2019-2024. They play a crucial role in shaping cultural policy at European Union level and in addressing the main areas of European cultural cooperation. The European Commission has identified six policy priorities for the period 2019-24: the European Green Deal (EC, 2019b) that aims to become the world’s first climate neutral continent; A Europe that is fit for the digital age by equipping people with cutting-edge technologies; An economy that prioritizes the well-being and success of individuals, promoting fairness and prosperity for all; Europe is working to have a greater presence in the world to achieve more and to reinforce its strong reputation for responsible global leadership; Promoting the European way of life by building an egalitarian Union where everyone has equal access to opportunities; A new initiative to promote, protect and strengthen democracy in Europe (Von der Leyen, 2019).

The extensive overview of European cultural policy and climate change has given us a strong basis for the chapters that follow. The intersection of these topics will be explored, focusing on what European policies say regarding climate change and its impact on cultural heritage.

### **3. Methodology**

The previous chapter has established the theoretical foundation for the current research. It highlights the relevant ideas and concepts that shape the perspective chosen in this thesis, specifically within the field of study concerning Cultural Heritage and Climate Change. However, Bryman (2012) argues that the theoretical framework has a wider purpose than

merely defining concepts, rephrasing existing theories, or incorporating expert opinions on a given topic. It also involves using previous research as a basis to develop an individual perspective on the subject of analysis. Furthermore, it involves learning from the methodological approaches and findings of previous scholars one's own analysis in a specific direction. The relationship between theory and data is established through a rationalised selection of the study design, followed by an explanation of the chosen technique. The approach consists of distinct processes, which are detailed in the subsections of data sampling, and data analysis. Finally, this section highlights the limitations and considerations.

### **3.1. Research method**

The research question addressed in this master's thesis is: "How are efforts to preserve cultural heritage from climate change currently being addressed in the European cultural policy objects? What strategies have been developed to address this issue?"

As Bryman (2012) defines, research strategy is a broad approach to conducting social research. However, it is important to note that there is no singular method for directing research in a particular topic of study, such as cultural policies. Rose (1993) explains the different methods used to analyse culture policies, covering the various viewpoints on their existence, purpose, evaluation, implementation, and improvement. The aim of this study is to systemize current policy actions that address environmental sustainability, particularly climate change, at various scales regarding cultural heritage, and compare different policies by finding which strategies they want to implement and how. To achieve this, a qualitative research approach is employed, and is the most appropriate method for this study because it allows for the examination of a wide range of data, including policy documents, government reports, seminars from individuals or groups with a vested interest. Furthermore, a qualitative analysis of policy content provides insight into the contextual factors that shape policy formation and implementation, that is crucial for assessing policy efficacy and recognizing possibilities for enhancement. Including the specific actions, interventions, and initiatives undertaken by governments, cultural organisations, and individuals to achieve the goals set by cultural policies. This study of cultural policies is practice-oriented, since it aims to understand how cultural policies are implemented in real-world scenarios and its effects on cultural creation, consumption, participation, and social inclusion (Bell & Oakley, 2014).

This qualitative research adopts a inductive methods by thoroughly analysing the existing policies and those that are still pending implementation (Bryman, 2012). The

qualitative approach is deemed the most suitable for this thesis as it allows for a more thorough investigation of discourse. Therefore, the aim is to consider the need for formulating cultural policies to safeguard cultural heritage, rather than solely serving as a repository of statistical information on the current stage of heritage in Europe. The main expected outcome is to find workable solutions to preserve cultural heritage for future generations. The results of this research will likely lead to a heightened awareness of the danger that cultural heritage is currently facing, and to a greater commitment by the European states to implement the recommendations set out in the relevant policies. The thesis contributes to the understanding of the complex relationship between climate change and cultural heritage conservation, it aims to provide an overview of the European situation in the context of climate change and cultural heritage, from its initial discussion to the present day, offering insights into both the environmental and cultural dimensions of the issue. I aim to objectively present the varied conclusions that have been reached on the implementation of new policies.

The selection of this method is justified because as Karppinen and Moe (2019), point out policy and industry documents offer a comprehensive understanding of policy concerns, debates, the historical and contextual background of political and regulatory development, the introduction of new concepts, policy-making choices, and the perspectives and attitudes of many stakeholders. The term “policy and industry documents” is commonly used in the field of public policy analysis to refer specifically to official documents. These documents have an impact on the process of making public decisions. Documents are considered important social constructs or cultural objects with distinct consequences and are worthy of individual examination (Syvertsen, 2004). Using documents offers several significant benefits. Documents are more stable than other sources, as they can be easily saved, retrieved, and duplicated. Many documents are readily accessible, providing scholars with direct access to policy processes and stakeholder perspectives (Karppinen and Moe, 2019). This research expects as a result that the current policies and strategies implemented may display differing levels of efficacy in alleviating the effects of climate change. This suggests that conducting a thorough analysis of the applied measures will uncover both effective interventions and areas necessitating improvement. Lessons derived from these policies, are anticipated to aid in the development of more resilient and proactive approaches to safeguarding cultural heritage from the dangers of climate change. The dissemination of research findings will increase public awareness of the impending risks climate change poses to cultural heritage. This strategy promotes individuals’ engagement with the severity of the issue and instils in them a collective sense of responsibility for preserving our cultural heritage. Policymakers and governmental agencies could use this

information to safeguard our shared cultural legacy, so it has significant societal relevance as it has the potential to inform effective strategies of protection.

### **3.2. Data collection**

Policy documents are written documents containing strategies, priorities, recommended actions, objectives and targets. They are produced by legislative, governmental, advisory or executive organisations. In order to identify the cultural policies at the European level that address the intersection of climate change and cultural heritage, an exhaustive search process was initiated. The initial search was conducted by entering the term “European cultural policy” into the Google search engine. This resulted in the European Commission website being displayed, offering insights into various projects undertaken over the years. Concurrently, broader searches were conducted on databases such as Google Scholar and Web of Science, with the objective of identifying cultural policy and reports that were not exclusive to the European Commission but also from other cultural entities and associations. Subsequently, a meticulous selection process started, with the aim of identifying between the identified documents the ones relevant to the topic of the research. Since the topic of the research focuses on the impact of climate change on cultural heritage, were chosen all the policy documents addressing this issue. This initial process of elimination lead to a selection of approximately 30 documents. A comprehensive examination of these documents was conducted, further refining the selection criteria. Documents that exclusively addressed either climate change or cultural heritage were eliminated, considering only those that dealt with both topics. Or they were eliminated if they addressed the two topics in conjunction, but not in the context of how cultural heritage can be safeguarding from climate change, but rather in terms of how it can assist in combating it. Nevertheless, certain documents, such as the European Green Deal (2019b) and a New European Agenda for culture (2018b), which primarily addressed a particular topic, were kept due to their pertinence and significance to the overall discussion. Through this methodical procedure, a final set of 13 policy documents was identified. These policies were carefully selected based on their thematic congruence and significant contribution to the research. The following table (Table 1) presents a full summary of the chosen papers, including their titles, issuing authorities, and publication year.

The analysis covers Europe as a whole, because coordinated action to tackle climate change should be taken at a level above individual nations. The European Union is seen as a key centre of influence because of its inherent power and ability to make a significant impact. The



research also emphasises that every individual or organisation, regardless of size, has a role to play in implementing effective measures to combat climate change.

**Table 1** The list of included policy documents

<b>Document</b>	<b>Approved by</b>	<b>Approved/published year</b>
Final Report of the Intergovernmental Panel on Climate Change	IPCC Scientific Assessment	1990
Report on the Noah's Ark project	European Commission	2004
Report on the STORM project	European Commission	December, 2017
Heritage at Risk: EU research and innovation for a more resilient cultural heritage	European Commission	2018
A New European Agenda for Culture	European Commission	May, 2018
The Future of Our Past: Engaging Cultural Heritage in Climate Action	ICOMOS	July, 2019
The European Green Deal	European Commission	December, 2019
European Framework for Action on Cultural Heritage	European Commission	2019
European Cultural Heritage Green Paper	Europa Nostra in partnership with ICOMOS	March, 2021
New European Bauhaus	European Commission	September, 2021
Strengthening cultural heritage resilience for climate change: where the European green deal meets cultural heritage	European Commission	2021
Horizon Europe	European Commission	March, 2021
Empowering People to Imagine and Realise Climate Resilient Futures Through Culture – from Arts to Heritage The Climate Heritage Network 2022-24 Action Plan	Climate Heritage NETWORK	September, 2022

### 3.3. Data Analysis

The research was conducted using a method of inductive code development, facilitated by the Atlas.ti software, which enabled the documents to be read and simultaneously coded. Coding is defined by Bryman (2012) as ‘the process of breaking down, examining, comparing, conceptualizing and categorizing data’. According to this description, the primary objective of coding was to identify and extract significant insights from the corpus of documents. A total of 105 codes were identified across the various policy, with many recurrences observed. The comprehensive coding scheme permitted a facilitated reading of the documents, whereby coded were employed rather than necessitating a re-reading of the entire text. This approach considerably accelerated the examination and comparison of the policies under review. Afterwards, the codes were methodically clustered into categories, thereby improving the analytical framework and increasing clarity. The categorisation process made it possible to group the policy documents into themes, based on commons characteristics such as strategies or lack of attention, while keeping them in a chronological order. The themes identified comprehend *challenges to overcome, problem identification, research interventions, less attention, Green Deal additions and action plans*. An example of this process is illustrated in the table below (Table 2), by using the themes “challenges to overcome” and research interventions” as examples, the division of themes will be explained further in the following section.

**Table 2** Theme-finding process

Codes	Categories	Themes
Online accessibility: “The Commission supports the digitization and online accessibility of European cultural heritage material, facilitating access to and engagement of citizens with cultural heritage (EC, 2018 p.11).	Accessibility	Challenges to overcome

<p>Barriers: “To meet this challenge, the Framework for Action focuses on breaking barriers to access.” (EC, 2019a p.11).</p>	<p>Accessibility</p>	<p>Challenges to overcome</p>
<p>Crisis: “This translates into identifying partial collapse and pre-collapse (crisis) situations, ..., with partial reconstructions where necessary for structural stabilisation, aiming at preserving scientific and documental values to the largest extent possible.” (EC, 2017 p.6)</p>	<p>Intervention</p>	<p>Research interventions</p>
<p>Monitoring: “Low impact monitoring techniques using satellites have the potential to spot vulnerabilities early and save money on post-disaster recovery. A key outcome of this project has been the successful application of new space technology to the cultural heritage sector, capable of monitoring surface deformation with millimetre precision.” (EC, 2019a p.8)</p>	<p>Intervention</p>	<p>Research interventions</p>

### **3.4. Quality of Research and Limitations**

Documents are more readily available and less expensive than other sources such as interview or survey data. However, the existence and convenience of multiple documentary sources can pose methodological difficulties. Different research questions require different standards for identifying relevant documents. Not all relevant documents are readily available, and those that are, may provide an incomplete or misleading picture of policy-making. In addition, a significant part of the policy-making process does not produce written records that can be analysed. Additional difficulties arise from the different characteristics of documents, they can present challenges in understanding their context and meaning. Furthermore, some may have been written for specific audiences and purposes, which can affect their style of argument, use of references and support for arguments. Having used data only at the European level, as an entity, and not from individual states or different continents, the results will be limited in that sense and more general. Of course, being this research a qualitative content analysis, the results are going to be subjective and intended for interpretation. Surely, a limitation of this research is that it considered policy documents, which cannot be expected to give information about what is actually being done. Instead, they offer recommendations to be considered. At the same time, I believe that this methodology was the most appropriate for this study, as it provides an overview of the European perspective on future developments and current practices.

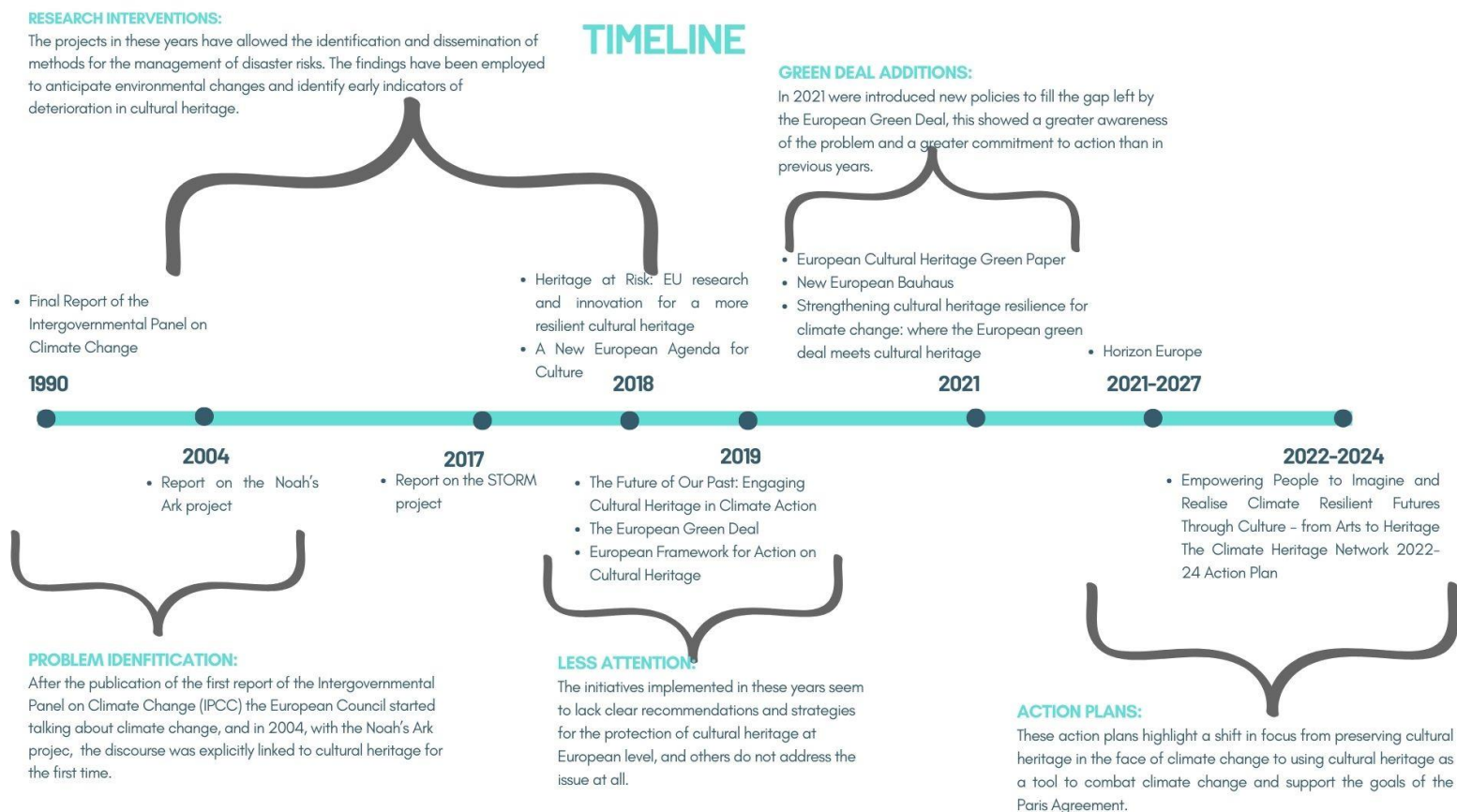
## **4. Findings and Discussion**

### **4.1. Introduction**

In order to fully understand the conclusions drawn from the examination and evaluation of policy documents, this chapter is structured based on the themes identified during data analysis. The initial section of the chapter is focused on the challenges associated with the protection of cultural heritage in the context of climate change. Subsequently, a chronological comparison of European policies is presented, starting with the earliest mentions of climate change, and concluding with the most recent initiatives, as shown in the timeline table below (Table 3). The themes were divided according to the similarities and differences between the policies, such as similar interventions or actions, lack of attention over the years and underlying topic. Indeed, it starts by describing the first policies that linked the climate change discourse with cultural heritage, then the first research interventions that were carried out between 2004

and 2018 that led to great progress in the management of disaster risks. Subsequently, there was a period in which less attention was given to the issue, and policies at the European level took steps backwards in this respect, only to recover a few years later with specific reports to fill the gap. Finally, the last sub-section is dedicated to recent action plans. The chronological framework is of great importance in order to address the study topic of the measures implemented at the European level. This chapter adopt a systematic analysis of policies, to compare their strategies and assess their validity. The utilization of a chronological method in the discussion of themes facilitates the organization of the thesis, enabling a logical examination of the development of policies and the context in which each one was formulated (Paquette et al., 2017).

**Table 3** Timeline of policy documents



#### **4.1.1. General background**

The importance of cultural heritage is determined by the fact that it is an essential resource that enriches social connections, stimulates economic development, and ensures environmental stability. Furthermore, as highlighted in the United Nations 2030 Agenda for Sustainable Development, culture, cultural heritage and the creative industries, are crucial for achieving fair and sustainable development. This is the reason why a series of measures are being developed to protect cultural heritage from the effects of natural disasters and climate change, that include investigate, create, and distribute evidence-based and cost-effective solutions and instruments. The concept of preserving cultural heritage is important not only as a universal responsibility but also as a European Union duty, as stipulated in the founding Treaties. Moreover, citizens also believe in that, in fact a recent Eurobarometer survey conducted by the European Commission revealed that 40% of Europeans believe that the EU should bear the primary responsibility for safeguarding Europe's cultural legacy (EC, 2019a).

Cultural heritage can help us improve our relationship with climate change and its impacts on societies in different time periods, locations and cultural backgrounds. Arts, culture, and heritage, which include sites, landscapes, institutions, collections, creativity, intangible heritage, traditional knowledge and traditions, can be useful to assist communities and to help them reduce greenhouse gas (GhG) emissions and to adapt to climate change. Nevertheless, climate change has been clearly identified as a major and rapidly escalating threat to people and their cultural heritage on a global scale, since it has the potential to affect and threaten cultural heritage, both tangible and intangible. However, there has not yet been a unified and coordinated political response to tackle this problem. For an increasingly complex problem, it is necessary to provide an increasingly complex response at all levels. So, in order to highlight the importance of cultural heritage in tackling climate change, it is imperative that it is integrated into all mainstream policies at both national and EU level. Since, despite cultural heritage is often mentioned in policies, there is no further consideration of specific actions to be implemented. Indeed, this lack of analysis reduces the potential for cultural heritage to benefit from these policies.

## 4.2. Challenges to overcome

The challenges posed by the convergence of climate change and cultural heritage can be effectively addressed by policymakers and researchers through the identification and resolution of a number of critical factors and barriers. It is the responsibility of governments to safeguard and promote national heritage by implementing policies that are both effective and inclusive. The objective of these policies is to enhance awareness among local communities and institutions of the importance of preserving their heritage (EC, 2018a). Nevertheless, this endeavour encounters a multitude of obstacles. One significant challenge is the increasing difficulty of adapting to rising global temperatures. The IPCC - Intergovernmental Panel on Climate Change - asserts that the capacity to successfully adapt heritage sites is contingent upon the efficacy of global initiatives aimed at reducing greenhouse gas emissions. It is questionable whether the European Parliament's ambitious aims are sufficient to meet the key 1.5°C warming limit. It is of the utmost importance to enhance and broaden the modelling of the anticipated consequences of global warming on cultural resources. This is crucial in order to emphasise the pressing nature of these concerns and provide guidance for decision-making procedures in transitioning towards environmental sustainability (Europa Nostra, 2021). The effects and severity of climate change are worse than imagined, posing a global threat to societies and the planet. The current enormous temperature swings marks the beginning of a new period, which will also be reflected on the heritage (EC, 2022). Cultural heritage is intrinsically delicate and susceptible to destruction and deterioration caused by both natural disasters and human-induced environmental degradation, including of course climate change. Inadequate or poorly planned interventions carry an additional challenge, to address the difficulty of safeguarding cultural heritage, it is imperative to create strategies and instruments that are founded on solid evidence and are efficient in terms of cost. These strategies should be designed to effectively manage risks and enhance resilience, as stated in the European Framework for Action on Cultural Heritage (2019). The effects of climate change on tangible heritage are evident in occurrences such as wildfires, severe weather events, floods, and erosion. Nevertheless, establishing a direct correlation between climatic change and the deterioration of monuments and buildings is still one of the biggest challenges, as is determining the extent to which climate change contributes to harm to indoor cultural heritage, as mentioned in the theoretical framework from the work of Choinis (2022). The rise in sea level represents a significant threat to coastal landscapes, while the deterioration caused by bacteria, pests, and

invasive species presents additional challenges (EC, 2022) , as we talked in the previous section regarding the castle and the coast of Santa Severa (Anzidei et al. 2020).

Another significant challenge to be addressed is the limited financial resources and incentives for implementing adaptation measures (EC, 2022). As indicated in the 2019 Future of Our Past Report, the reliability and effectiveness of conservation materials and procedures may be compromised in the face of changing environmental conditions. There will therefore be a need for implementation of adjustments and the development of more ecologically suitable alternatives, that will not deteriorate over time. It is also imperative to prioritise the dissemination of scientific and technological information in order to protect cultural heritage at risk from climate change. This necessitates the development of techniques for evaluating the energy efficiency capacity of historical structures, the enhancement of data gathering and dissemination, and the establishment of financial provisions for initiatives aimed at mitigating and adapting to climate change (EC, 2017). Furthermore, maladaptation, which refers to the accidental harm caused to heritage as a result of climatic actions, represents a significant challenge. Examples include inadequate improvement of the energy efficiency or poorly planned renewable infrastructure that causes harm to cultural environments (EC, 2022). It is crucial to have ongoing maintenance, extended monitoring, and accurate climate predictions in high detail for cultural heritage in order to effectively tackle these challenges. The following section presents the various policies that have been implemented with the objective of overcoming the aforementioned challenges.

### **4.3. Problem Identification**

In 1990, the European Council started talking about climate change after the publication of the first report of the Intergovernmental Panel on Climate Change (IPCC). This discussion was held in preparation for the coming negotiations for the United Nations Framework Convention on Climate Change (UNFCCC). EU Heads of State and Government agreed to maintain the European Community's greenhouse gas (GhG) emission at same level as they were in 1990 by 2001. Due to the lack of specification on the methods to achieve emission reductions, a discussion on the implementation of common and co-ordinated policies and measures (CCPMs) was initiated. In the early stages of climate policy development, three main aspects of climate policy were identified and focused on, which are still relevant today: the reduction of greenhouse gas



emissions (GhG), the promotion of renewable energy sources (RES) and the improvement of energy efficiency.

The Intergovernmental Panel on Climate Change (IPCC) was determined in 1988 by the United Nations Environment Programme (UNEP) and the World Meteorological Organisation (WMO), to provide policymakers with numerical data of climate change and its potential impacts. The IPCC was created for the increasing concern about changes, caused by humans, to the Earth's climate system. The main objective of the 1990 IPCC Assessment Report was to provide an assessment of the current scientific understanding of climate change. The main aim was to establish current knowledge on the causes, consequences, and also possible strategies to implement to deal with climate change. The report analysed the greenhouse effect, atmospheric concentrations of greenhouse gases, actual changes in climate patterns, and projections of future climate scenarios. The research confirmed that burning of fossil fuels and deforestation, are the greatest contributor to the increase in greenhouse gases in the atmosphere, which lead to global warming. The evidence shows also an increase in global temperatures in the 20th century as a result of the greenhouse effect caused by humans.

The report explains the importance of leading methods of risk assessments and prevention in the development of climate policies. It also analysed methods of reducing impacts, such as decreasing the emissions of greenhouse gases, for example carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). Methods for reducing emissions include the improvement of energy efficiency, the transition to renewable energy sources, and a legislation to restrict emission from industrial and transportation sectors. Policies and activities that support sustainable development pathways were approved by the report. This was done to guarantee that measures to mitigate and adapt to climate change are complementary and inclusive for all members of society. Although the study did not offer solutions or steps to mitigate climate change, it serves to began talking and promoting activities in addressing this issue.

Following the establishment of the Intergovernmental Panel on Climate Change (IPCC) in 1990, subsequent conferences were organised and additional policies were implemented. Nevertheless, the exclusion of cultural heritage from the IPCC report is a matter of concern. Indeed, it was not until the Noah's Ark project in 2004 that the discourse on climate change was explicitly linked to cultural heritage for the first time. The Noah's Ark Project, which forms part of the 6<sup>th</sup> EC Framework Programme on Research, addressed the impact of climate change on constructed heritage and cultural landscapes in Europe. The objective was to develop methodologies for the mitigation and adaptation of the impact of climate change and related

disasters on historic structures, sites, monuments, and materials that are most vulnerable to these changes. Three primary threats are mentioned: the impact on historical buildings, the biodeterioration, and the reaction of materials. The project proposed Mitigation and Adaptation Strategy Guidelines to enable the principal cultural heritage stakeholders – owners and curators of historic buildings and collections, public policy- makers and national heritage organisations – to deal with both catastrophic climate impacts and more pervasive and subtle long-term effects. The study conducted investigated the impact of climate change on historical edifices by employing sophisticated computer models to forecast the flow of heat and moisture within these structures. The EnergyPlus<sup>1</sup> software was identified as the best to evaluate the suitability of existing building simulation programmes for the hydrothermal conditions of old buildings. The wooden church of Debno, Poland, a UNESCO World Heritage Site, was the first case study building to be used EnergyPlus. A simulation model of the church was created, with as inputs the physical characteristics of the building and a local climate weather of a year. The model can replicate the internal environment of the building by considering the exterior climate conditions and the building's physical conditions. Additionally, is capable of calculate dew point, surface temperatures, and surface relative humidity. The model is utilised to identify the consequences, especially climatic factors such as weathering degradation, like when combined with precipitation, strong winds, severe rainfall, flooding, and landslides. Additional strategies were utilised include wind tunnel tests and modelling to assess wind-driven properties and wind loads on historical buildings. This is done with a particular focus on susceptible structures such as towers. Numerical models were utilized to compute the flow of air and distribution of pressure around structures, thereby aiding the identification of susceptible regions and providing guidance for preservation endeavours.

An outcome of the Noah's ark project was employed to create maps that illustrate the regions of Europe where there is risk of deterioration of materials. The completed maps were translated into a vulnerability atlas, which displayed data pertaining to cultural heritage and provided detailed meteorological information regarding the extent of damage and potential threats. The Atlas, developed as a component of the Noah's Ark project, was constructed as a tool to assist heritage managers in making crucial decisions that impact the preservation of heritage for future generations. The legislation and standards for buildings, architecture and heritage are typically derived from the prevailing context. However, it is necessary that these

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<sup>1</sup> EnergyPlus is a software that does energy analysis and thermal load simulations. It utilizes a users' description of a buildings' physical structure and mechanical systems, to calculate the needs of heating and cooling to maintain desired temperature conditions.

structures be capable of withstanding a significant period of time. The project was the inaugural initiative to address this issue, thus setting the precedent for defining the guidelines to be incorporated into the following EU policies. In order to incorporate the protection of cultural heritage as a necessary requirement to achieve sustainable development, it is necessary to include immovable cultural heritage as one of the indicators for integrated assessment. It took several years but European policies finally identified the impact of climate change on cultural heritage. In the following paragraphs, we observe the progression of policies following the recognition that measures need to be implemented.

#### **4.4. Research Interventions**

Following the Noah's Ark project, there has been a lack of subsequent discourse on European initiatives and strategies aimed at protecting cultural assets from the impacts of climate change. At least until 2017, when the STORM initiative brought together heritage and technology professionals to collaboratively address these concerns. After meticulous selection of sites from five different countries, which exemplify common issues and are especially indicative of specific dangers such as flooding, mass tourism, strong winds, coastal erosion, or earthquakes, a series of case scenarios were established for each location. The five main sites chosen were Mellor (England), Rome (Italy), Rethymno (Greece), Tróia (Portugal) and Ephesus (Turkey). STORM's primary areas of interest are prevention, intervention, and policy.

The strategic approach of the project utilised a development of predictive models and advanced monitoring systems. These tools are employed to anticipate environmental changes and identify early indicators of deterioration in cultural assets. Diagnosis was conducted by installing permanent sensors at the sites or, at the very least, by frequently utilising them to monitor the dynamics of natural hazards. Intermittent multispectral aerial photography was being conducted using reflectance spectroscopy, while occasional data was obtained by X-ray based p-XRD and XRF analysis at Mellor, techniques used to identify and quantify the chemical composition of materials. At the Baths of Diocletian in Rethymno and Ephesus were used, crack monitoring, ultrasound, and other vibrational techniques. The INOV-developed induced fluorescence sensor underwent testing at Tróia on the wall murals of the Basilica. The objective was to identify the presence of biological colonization at an early stage, prior to it becoming visible, typically indicated by the presence of green stains. This approach allows treatments and minimises the harm caused to the affected surfaces. Due to its affinity for humidity, this hazard

is closely linked to the monitoring of environmental conditions conducted by the weather station, which is an integral component of permanent diagnostic systems.

The photogrammetry, is a method used for documenting the Roman constructions in Tróia that are situated along the shoreline, and is one of the most employed to generate precise measurements and three-dimensional representations of objects or landscapes by utilising overlapping images. This technology is advantageous in that it is not only more adaptable in hard-to-reach regions, but also more economical compared to alternative methods. The implementation of conservation measures specifically designed to stabilize and strengthen historical structured represents an effective means of enhancing their ability to withstand and recover from disastrous events. The conservation-restoration efforts at Tróia try to prioritize the most pressing issues with the stone structures, while at the same time stay within the budgetary limitations. This refers to the process of recognizing signs of partial collapse and pre-collapse situations, with when needed a partial reconstruction for structural stabilization. The ultimate goal is to preserve scientific and documentary values to the greatest extent feasible. The development of the STORM (2017) disaster risk assessment for Tróia allows to plan for its conservation, leading to a better informed prioritization of the activities. Similarly, the disaster risk management strategy, developed following the assessment stage, allows the identification and implementation of readiness and response activities to be carried out in disaster situations to protect the material assets of the heritage. It is important to underline that the Tróia sites lacked any emergency procedures specifically designed to protect the archaeological structures. This underscores the significance of implementing the STORM tools and framework, which are tailored to the distinctive characteristics of the Roman Ruins.

The report revealed that none of the five countries had a risk management plan for cultural sites, that is founded on validated knowledge and a multi-hazard methodology. In all countries, regardless of their political structures and administrative systems, there is a prevailing tendency to react to catastrophes rather than to take a proactive approach focused on preventing or preparing for the detrimental impacts of disasters on cultural assets. The Council of Europe and the European Commission, have all underlined the importance of promoting the advancement of scientific and technological knowledge in order to protect cultural treasures that are at risk from natural hazards and climate change. In alignment with the contemporary issues surrounding heritage policies and processes, it is of paramount importance to devise and implement Disaster Risk Management strategies for cultural heritage.

Since 2018, European policies have been active in creating projects, reports, and funding useful experiments. Although STORM (2017) remains one of the most successful project, with

important practical findings that are still being used, other policies have also been beneficial. One example is the European Framework for Action on Cultural Heritage (2019), designed to outline a trajectory for heritage related projects on a European scale. It examines the tangible, intangible, and digital aspects of cultural heritage as indivisible and interrelated. The organization views cultural heritage as a valuable asset for the future, which should be protected, improved and promoted. This report represents the inaugural effort to establish a comprehensive strategy for managing cultural heritage on a European scale. It is similarly important to apply evidence-based decision making in the cultural heritage sector as it is in other policy areas. The Framework for Action is founded upon pillars, those of our concern are: “Cultural heritage for a Sustainable Europe: smart solutions for a cohesive and sustainable future”; and “Cultural heritage for a resilient Europe: safeguarding endangered heritage”.

The action undertaken include the following:

- The identification and dissemination of methods for the management of disaster risks, and the permission for a study on the protection of cultural heritage from both natural and man-made disasters, which contributed to the implementation of the Sendai Framework for Disaster Risk Reduction.
- Promoting enhanced collaboration among Member States, allowing assistance for research and projects aimed at enhancing the knowledge of the risks that disaster losses and the enhancement of the evidence base.
- Identifying the monuments, sites, and landscapes in Europe that are most at risk and to engage public and private partners at all levels in order to secure a sustainable future for these valuable cultural assets.

These aforementioned actions led to the implementation of projects during the European Year of Cultural Heritage. The European Commission, with the backing of Horizon 2020, provided funding for research and innovation projects with a total budget of EUR 18 million. The objective of these projects was to develop and test new solutions to enhance the resilience of historic assets to disasters, in order to facilitate their reconstruction in a sustainable way. Indeed, these initiatives facilitated the advancement and widespread implementation of evidence-based and cost-effective solutions for adapting to and mitigating the effects of climate change. Moreover, in accordance with the Union Civil Protection Mechanism, the European Commission provided financial support for projects regarding the prevention of cultural heritage, to facilitate the acquisition of data and enhances the capacity to prevent, prepare for, and respond to natural disasters.

Thus it is clear that from 2018 onwards, the European Union started recognizing the seriousness of the situation. They began making coordinated efforts, particularly in allocating resources to initiatives and investigations aimed at reducing the significant challenge of climate change. Nevertheless, the strategies outlined in this policy framework are fairly vague, without specific action plans. Instead, it provides conceptual frameworks to guide future operational efforts.

#### **4.4.1. Monitoring and data standardization strategies**

Since 2018, the European Union has implemented measures to address cultural heritage, as the introduction of a range of policies and programmes to protect and preserve. To follow this progress and gaining a comprehensive understanding of policies, a valuable resource is the document titled “Heritage at Risk: EU research and innovation for a more resilient cultural heritage” (2018a). This document provides a summary of all the projects funded by the European Union that pertain to cultural heritage. The principal objective of these projects is to facilitate sustainable development, social cohesion, and the preservation of cultural heritage across Europe. The majority of the mentioned projects are then examined as independent projects, while just a select few intriguing strategies will be derived from the others. The HERITAGE PLUS (2018) initiative utilised satellites to employed minimal impact monitoring approaches, which have the capability to detect vulnerabilities at an early stage and reduce costs associated with post-disaster recovery. One important strategies utilised in this research is the cutting-edge space technology, that has the capacity to accurately measures surface deformation with an accuracy of millimeters. A total of 400 UNESCO World Heritage Sites in Europe were subjected to analysis, with the data obtained being merged with existing geo-hazard datasets. The project team works closely with a number of partners, including the UK’s Natural Environment Research Council and the Cyprus University of Technology, in order to identify and prioritise those cultural heritage sites that are at the highest risk of extinction across Europe.

Also in the report, entitled “The Future of Our Pasts: Engaging cultural heritage in climate action” (ICOMOS, 2019) the importance of monitoring cultural heritage is emphasised. This is of great importance for the comprehension of the effects of climate change and the evaluation of the efficacy of adaptation measures. In order to establish a data bank of monitoring outputs and construct a suite of tools based on suitable and sustainable monitors and indicators, it says that is necessary to implement a coordinated and methodical strategy. It

is recommended that efforts be made to standardize data collection across different locations in order to facilitate analysis and indicate the rate of climate change. This can be achieved by either supplementing or making minor adjustments to existing documentation systems, also to facilitate the dissemination of best practices and enhance comprehension of prevalent risks and consequences. The regular implementation of effective fundamental conservation techniques, as the ongoing maintenance and careful protection of a location and its surroundings, can often serve as an adaptation and/or mitigation strategy. With the implementation of preventive maintenance plans that prioritise adaptation and mitigation, conservation measures, make informed management decisions, ensure the timely completion of essential maintenance task, could be effectively carried out by owners and managers. Furthermore, the utilization of energy resources is useful for the maintenance of heritage sites, and also it allows to simultaneously preserve the i values, authenticity, and integrity of the heritage. It is evident that in the majority of cases, maintenance represents the most straightforward, cost-effective, and readily accessible method for conserving energy. Structures and landscapes that have been well preserved are more resistant to frequent and strong occurrences of rainfall. The objective of this report, and also of this thesis, is to establish a connection between heritage-based knowledge and climate change policy in order to generate synergistic effects.

From a pragmatic standpoint, the project SmARTS, which is mentioned in the report “Heritage at Risk: EU research and innovation for a more resilient cultural heritage” (2018a), has developed a range of tools for examining, tracking, and studying cultural heritage resources. Every device is constructed upon freely available and open-source hardware and software, as well as the principles of economic sustainability. To illustrate the project it developed a robot that employs a non-destructive and non-invasive method, which is crucial for handling delicate surfaces. The robot was employed to examine the surface structure and colouration of a assortment of Catalan modernist hydraulic tiles, utilising an image system and a miniature spectrophotometer. Guadenzi, the principal investigator, asserts that the acquired data has been of significant value in informing conservation and restoration efforts. Additionally, the initiative was designed for the specific purpose of preventive conservation in museums, art galleries, and historical archives. Gaudenzi states that they created prototypes for data loggers that measures temperature, relative humidity, and dew point. Additionally, they developed devices for monitoring ultraviolet, visible, and infrared light irradiation. The aforementioned prototypes have undergone rigorous validation in both controlled laboratory settings and real-world environments. The report highlights as a strategy the utilization of choice of indicators, which are replacement to evaluate different aspects of vulnerability to climate change. These

indicators serve to guide policy and planning choices on the conservation of cultural assets. To establish a data bank of monitoring outputs and construct a suite of tools based on suitable and sustainable monitors and indicators, a coordinated and methodical strategy is needed. This would facilitate the exchange of best practices and the comprehension of prevalent risks and consequences. Furthermore, collecting and disseminating standardized data, both nationally and internationally, has its difficulties but is a very advantageous approach. The combination of conventional methods and innovative technological advancements allows for the examination of climate change development.

In addition, the document “European Framework for Action on Cultural Heritage” also conducted comparable actions, specifically by identifying and disseminating exemplary methods in disaster risk management. A significant milestone was the initiation of the “Study on Safeguarding Cultural Heritage from Natural and Man-Made Disasters”, which marked the initial comprehensive assessment of policies and tools at the European Union level. This initiative facilitated the implementation of the Sendai Framework for Disaster Risk Reduction and also promoted collaboration between Member States. Furthermore, thanks to the framework, were made research and development initiatives to understand the risks that disasters pose to cultural heritage. One example is efforts to collect data on disaster losses, reinforce the body of evidence, and examine the impact of natural disasters on cultural heritage, while improving preventive measures. Moreover, the framework placed a high importance on the identification of the most endangered monuments, locations, and landscapes throughout Europe. Efforts were made to include both public and private stakeholders at different levels in order to ensure the sustainable future of the rich heritage assets. This was achieved through initiatives such as the 7 Most Endangered programme, which was implemented in collaboration with Europa Nostra.

The 2004 Noah’s Ark project initiated a series of research interventions that have been extremely useful from 2017 to 2019. Throughout this period, numerous methods were discovered, like the photogrammetry one, and effective strategies were implemented. Indeed, these projects have significantly contributed to the advancement of knowledge and the development of proactive attitude on the part of European policies.



#### **4.5. Less Attention**

“A New European Agenda for Culture” (2018b) uses culture and education to present an attractive image of the European Union, as asked by the European leaders. This serves to facilitate innovation, creativity and sustainable job opportunities, which lead to economic prosperity. The agenda put particular emphasis on its social aspect, since it recognize the central role of cultural and cultural diversity for social cohesion and well-being. The primary focus of this initiative is to ensure that cultural activities are accessible to all Europeans. In line with this agenda, the Commission commits to implementing specific activities to promote social inclusion through programmes such as Creative Europe and Erasmus+. Surprisingly, the cultural agenda does not mention climate change and environmental degradation, despite its coverage of areas such as health and economics and despite its aim to protect and advance European cultural heritage.

Similarly, but in reverse, the “European Green Deal” (EC, 2019b) is a policy created by the European Commission to seriously tackle the issue of climate change. It want to transform Eu into a fair, prosperous and resource-efficient society. The goal is to achieve net-zero greenhouse gas emissions by 2050 and to separate economic growth from resource use, that lead to emissions. It also includes to eliminate all forms of pollution, protect ecosystems and biodiversity, encourage sustainable transportation and construction methods, in order to mobilise the sector towards a clean and circular economy. Although the European Green Deal has many goals, it does not specifically mention cultural heritage as one of its priorities, despite the intrinsic importance of cultural heritage in reducing the effects of climate change (EC, 2019). Despite the implementation of initiatives aimed at addressing the intersection of these two concerns, the policies developed during this period appear to lack clear recommendations and strategies for the protection of cultural heritage from adverse effects of climate change at European level.

#### **4.6. “European Green Deal” additions**

In the context of the global pandemic, it also occurred a sense of urgency in dealing with climate change, as they realized how precarious everything is. The European Union has defined the European Green Deal as a key aspect of turning Europe’s socio-economic situation around. Nevertheless, there is a need to accelerate efforts and demonstrate greater resolve in

addressing these challenges, so EU leaders and institutions have to acknowledge heritage as an essential part of this challenging mission. In 2021, were introduced two new policies: “The New European Bauhaus”, that has the same principle of the European Green Deal but it adds creativity and culture, and the other one is the “European Cultural Heritage Green Paper”, that differ from the European Green Deal because it include the connection between cultural heritage and climate change (EC, 2019b).

The main objective of the New European Bauhaus (NEB) is to demonstrate the advantages of adopting an environmentally-friendly approach through tangible experiences at the community level, that expand the overall quality of daily living. The NEB project take inspiration from the historical Bauhaus, which was founded in 1919 in a period of societal and industrial change. Similarly the New European Bauhaus project aims to address current difficulties in the midst of deep societal shifts. It intends to bring together artists, designers, architects, and craftspeople from many disciplines to collaboratively address the challenges of the modern world, following a transdisciplinary approach similar its predecessor (EC, 2021a). The New European Bauhaus is based on three principles: sustainability, aesthetics and inclusion. The promotion of collaboration and learning between this abovementioned fields facilitates the exchange of ideas, and skills, that are essential for transformation. The NEB initiative aims to develop green, digital, and resilient ecosystems.

Although the New European Bauhaus (NEB) programme incorporates cultural elements deepening the scope of the European Green Deal (EC, 2019b), it does not specifically address the protection of cultural heritage in relation to climate change. Indeed, to address this gap in the current literature, the European Cultural Heritage Green Paper (2021) was developed through a collaborative effort between Europa Nostra<sup>2</sup> and the International Council on Monuments and Sites (ICOMOS). This document originated from the process of integrating the fundamental skills and factors related to cultural heritage with crucial elements of the European Green Deal, utilising the policy framework described in the ICOMOS report. The Green Paper serves for evaluating the impact of the cultural and heritage sectors while promoting the European Green Deal (EC, 2019b). Furthermore, it helps to promote cooperation between climate policymakers and cultural actors, in the fields of history, culture, sustainability, climate research, and climate action. This is in order to encourage creative strategies and support Europe’s shift towards a more environmentally friendly future. The Green Paper presents a number of suggestions:

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<sup>2</sup> Europa Nostra is an international federation dedicated to the preservation of Europe’s cultural and natural heritage.

- Demand to improve impact assessment approaches to include cultural aspects. In more precise terms, the screening tools being developed in accordance with the new EU Taxonomy Regulation should provide detailed information on how activities associated with renewable energy infrastructure could potentially harm environmental goals by negatively impacting cultural ecosystem services and human rights.
- Create a new forum at the European Union level with the purpose of promoting productive discussions among stakeholders of environmental conservation, heritage preservation, and the renewables industry. This platform would allow more sophisticated and synchronized research efforts focused on measuring and reducing the effects of renewable energy infrastructure on people and landscapes.
- Implementation of efficient and affordable approaches to encourage the use of heat pumps and expedite the conversion of older and historic buildings to electricity, while also safeguarding their cultural significance.
- Guarantee that heritage buildings are given sufficient attention under the new EU Smart Readiness Indicator framework. This necessitates the creation of a customized plan for the intelligence of services implemented in historically significant buildings, thereby ensuring their successful integration into contemporary smart infrastructure frameworks.
- Using cultural heritage sites as a means of demonstrating and promoting methods of reducing the impact of climate change, enlightening tourists about the issue, and encouraging behavioural changes towards more environmentally friendly practices.

Simultaneously, an Open Method of Coordination (OMC) group comprising experts from Member States was established with the objective of enhancing the resilience of cultural heritage in the context of climate change. The group's mission is to investigate the role of cultural heritage in the European Green Deal (EC, 2019b) and to identify risks and deficiencies in cultural heritage in relation to climate change. Furthermore, to ensure that the development and implementation of climate change measures at both the European and national levels commence without delay. A greater awareness is apparently developing that despite cultural heritage is often cited in policies without concrete measures being specified the opportunities for cultural heritage to benefit from them is diminishes. The OMC expert group on enhancing the resilience of cultural heritage to climate change represents the first group organised of experts appointed by EU Member States to cooperate at the European level on climate action specifically related to cultural heritage. This research is particularly interesting and relevant to this thesis because of its objectives, including: to gather data on the current state of cultural

heritage in the Member States; the identification and dissemination of effective strategies and innovative approaches for the safeguarding of both tangible and intangible cultural heritage in the context of climate change; evaluate the existing and prospective dangers presented by the consequences of climate change on cultural heritage.

Strategies recommended include to:

- Utilization of simulation and modelling techniques, that rely on data and artificial intelligence to guess the response of cultural heritage items in varied settings and under diverse future climate conditions.
- Engagement in comparative research and the facilitation of the exchange of knowledge between regions that have similar climates, building types and environmental risks.
- Creation of novel and replicable strategies to adapt various forms of cultural assets that are at risk due to both slow shifts in climate and extreme weather events.
- Assessing the financial cost of the implementation measures to adjust cultural heritage to the effects of climate change in order to make more informed decisions.
- Utilising remote real-time sensing, satellite data, and earth observations to continuously monitor material and structural changes resulting from natural and human-induced climate hazards.
- Employing an ICT platform to gather and merge information from multiple sources in order to offer an overview of the situation.

The integration of these recent reports and policies serves to illustrate a heightened recognition of the problem and a greater imperative for action compared to previous years. Although there has been an increase in the number and frequency of policies addressing this issue – with three only in 2021- since the initial project in 2004 -Noah’s ark project- and 2017 – STORM project- these policies have evolved to primarily suggest potential strategies rather than implementing concrete monitoring and risk assessment methodologies. Consequently, while there has been an intensification of awareness and commitment, the application of specific, actionable methods remains lacking.

#### **4.7. Action plans**

The most recent policy documents under consideration include two significant action plans. These documents highlight a shift in focus from preserving cultural heritage in the face of climate change to use cultural heritage as a tool to combat climate change and support the objectives of the Paris Agreement. The first one is Horizon Europe, a funding programme for

research and innovation in the European Union from 2021 to 2027, it addresses a number of significant issues, including health, food, sustainability, and climate change. The programme has been designed to facilitate the achievement of the United Nation's Sustainable Development Goals and to increase the European Union's competitiveness and economic expansion. The primary objectives of this initiative are to improve the scientific and technological basis of the European Union, to promote the European Research Area, and to facilitate the green and digital transitions. Horizon Europe provides financial support for a number of specific projects related to climate change and cultural heritage: the creation of tools and procedures models to forecast the future effects of climate change on cultural heritage assets; enhance the digital documentation and virtual reconstruction of endangered heritage monuments (EC, 2021b).

The second one is The Climate Heritage Network (CHN) 2022-24 Action Plan and is based on the assertion that culture, encompassing arts and heritage, has the potential to help climate action. The primary objective of the CHN is to facilitate transformation by establishing connections among its members and partners from diverse sectors. This will result in a realignment of climate policy, planning, and action at all levels to more effectively integrate cultural aspects. The approach prioritizes strategies that are based on specific locations, demand from consumers, and the needs of individuals and that aim to protect and support cultural aspects that encourage sustainable, circular, and regenerative lifestyles. The methods employed to achieve these objectives include: the creation of "guiding values" for culture-focused climate action; the development and dissemination of resources to assist CHN members in utilising culture to cultivate low-carbon, climate-resilient futures; the involvement of influential cultural figures in important climate policy matters.

## **5. Conclusion**

This fifth chapter of this thesis presents the conclusions drawn from the analysis of policy documents. In order to answer the research question of how efforts to preserve cultural heritage from climate change are currently being addressed at the European level, and what strategies have been developed to address this issue, the documents were analysed. It was found that there has been a noticeable increase in recognition and integration of cultural heritage within broader climate change policies. This is particularly evident in the European Green Deal (2019) and subsequent initiatives. Once the problem was identified as serious, there was a shift in focus towards taking precautions and worrying about the issue at the European level. While earlier projects like Noah's Ark (2004) and STORM (2017) primarily focused on

addressing climate-related risks to cultural heritage, recent policies such as the New European Bauhaus (2021) and the European Cultural Heritage Green Paper (2021) explicitly aim to integrate cultural heritage into the wider climate action agenda. Despite the progress in recognizing the importance of cultural heritage in climate change policies, there still is a gap between rhetoric and concrete action. Given that policies set out strategies and recommendations, there is a lack of specific, actionable methodologies for monitoring, assessing risks, and implementing adaptation measures for cultural heritage sites. Consequently, there is a clear need for more targeted and practical approaches to address the challenges posed by climate change on cultural assets. This research places particular importance on identifying the strategies implemented in the various reports and policies, expecting from these documents a greater commitment to actions. There is a strong effort by research and innovation to support climate action in the context of cultural heritage. Funding programmes such as Horizon Europe (2021b) assign resources for projects focused on forecasting the effects of climate change on heritage, enhancing digital communication, and virtual reconstruction of monuments. This highlights the necessity of using technology and scientific advancements to safeguard cultural heritage in the context of climate change. Of particular interest are the recent initiatives, that have recognized the importance of complete approaches, that involve various disciplines and sectors. Projects support a transdisciplinary collaboration, bringing together artists, designers, and architects, to tackle climate challenges in an innovative and creative way. Similarly, the Climate Heritage Network (2022) underlines the integration of cultural heritage into climate policy, planning, and action at all levels, highlighting the connection between culture, climate, and sustainability. It is evident that there has been a shift in policy perspectives, since cultural heritage moved from passive observer to an active participant in the fight against climate change. This transformation is evident in initiatives that support the reuse of buildings, integrate cultural aspects into climate planning, and highlight the role of culture in sustainable development. The dissemination of resources and engagement with influential cultural figures play a crucial role in promoting culture-focused climate action. These initiatives intend to change and promote low-carbon, climate resilient future.

In conclusion, it can be concluded from this research that while numerous measures remain to be taken to address climate change and its impact on cultural heritage, the growing awareness is a crucial step towards the development of solutions. Consequently, the awareness that has been accumulated over time by the European Union and the effort to take action are admirable. By collaborating with other sectors and stakeholders in this field, more effective

strategies and actions can be implemented to safeguard cultural heritage, given the considerable potential.

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