# CHARISMA

Cultural Heritage Academy for Risk Management

| PROJECT
RESULT N.1

## 2022

Study on risk assessment and management of cultural heritage across Europe

# Study on risk assessment and management of cultural heritage across Europe

## *Risk Management for Cultural Heritage*

**PROJECT RESULT N.1**

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# PR1: Study on risk assessment and management of cultural heritage across Europe

## 1. Introduction

### Objectives of WP1 and tasks description

The WP1 report aims to provide a study on risk assessment and management of cultural heritage across Europe, with a specific focus on targeted countries: Italy, Austria, Czechia, and Germany.

The study on risk assessment is based on the desk research activity articulated into three distinct tasks aimed at providing a framework to address the risk of climate change in a structured way, by incorporating the necessary knowledge and skills to assess and address potential risks on cultural heritage from natural disasters.

● Task 1 (The need - desk review): desk review of existing evidence on climate change and increased risks for tangible cultural heritage in Europe with a particular focus on the targeted countries.

● Task 2 (Stakeholder map): mapping of the different cultural heritage institutions involved in the job market as potential employers of risk managers in cultural heritage (archives, libraries, museums, etc.).

● Task 3 (Assessment of the legal framework): Assessment of the current situation (plans developed, legislative frameworks, etc.) about risk management related to climate change for each category mapped in each targeted Country.

### Task 1.1 - The need: Desk review

Desk review activity is aimed at identifying the most relevant sources of information and documents from scientific literature and grey literature, including guidelines and policy documents. Identification and comparison of scientific and operational documents is focusing on:

- pushing National and Regional policy-makers on integrating tangible cultural heritage in their legislation regarding natural disaster and climate change management;

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- inviting Cultural Institutions at National levels to re-train their own staff, but with short and exclusive training events;

- providing framework and recommendations for investing more resources in risk prevention and recovery from disasters from scientific literature;

- finding best practices methods and solutions from cases-studies and European funded projects.

## Description of the workflow

The identification and analysis of the scientific literature is performed by means of such a complex methodological procedure, articulated into the following steps:

- Query search definition
- Data collection
- Selection criteria definition
- Database organisation

Query search definition consists of the identification and association of keywords to direct the search for relevant scientific literature on platforms such as Google Scholar or indexed databases such as Scopus. For this purpose, the data collection was set up on the association of the term "cultural heritage" with "risk management" and "risk assessment" in order to reconstruct a theoretical framework of reference on concepts, methodologies, tools, and case studies. This step returned 460 preliminary results.

To select an essential bibliography, advanced selection and exclusion criteria for preliminary results were then adopted. Among the selection criteria were considered: (1) literature review papers for the reconstruction of the state-of-the-art, concepts, methods, and tools used in risk management on cultural heritage; (2) EU funding paper to identify best practices and relevant guidelines within the European Union. All publications external to the European context and of a specifically technical nature were instead excluded in order to frame problems limited to targeted countries and to the knowledge useful for the training of a risk manager.

## An overview of main statistics on RMCH research topic (scientific literature)

The analysis of the scientific literature provides an orientation framework on the management of risks on cultural heritage, first of all attesting to the multidisciplinary characteristics and perspectives. The selected publications address the topic mainly from (1) the perspective of environmental sciences, to study the risk conditions for cultural heritage in the context of climate change; (2) from an engineering perspective to identify technical and technological solutions

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for risk mitigation; (3) finally from a social sciences perspective to study the socio-cultural and economic impacts of damage and organisational models for the sustainable management of cultural heritage (fig. 1).



Figure 1 - Scientific publication documents by subject area (Source: Scopus)

Secondly, the statistics confirm the actuality of the topic with a net increase in publications in the period 2014-2022 (fig. 2).

## Documents by year — Scopus
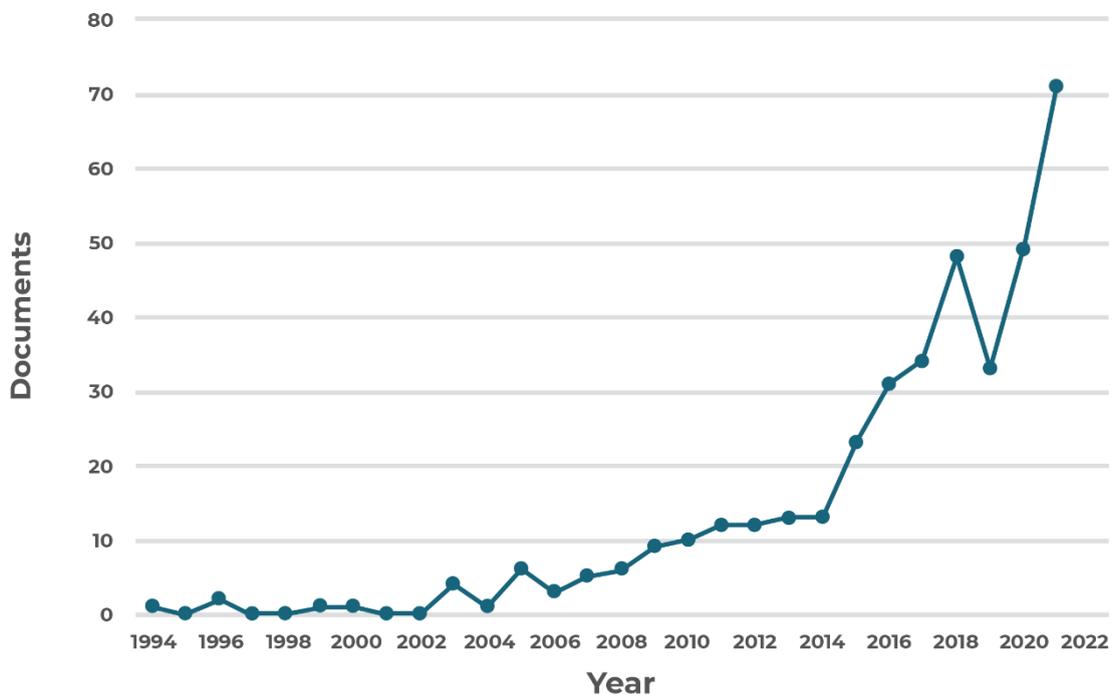
Figure 2 - Increase of publications on Risk Management on Cultural Heritage by year (Source: Scopus)

Finally, it is interesting to note how scientific research on Risk Management in Cultural Heritage in Europe is mainly funded by the European Commission from community programs such as Framework Programme and Horizon 2020/Horizon Europe to indicate the strategic role assumed by the management of cultural heritage in the operational and programmatic guidelines of the European Union (fig. 3).

**Further sources (Grey literature)**

The scientific literature constitutes the basic guideline knowledge for the training of a risk manager. Further complementary documentation then extends to: (1) technical report and grey literature; (2) projects financed by the European Union.

## Documents by funding sponsor

Compare the document counts for up to 15 funding sponsors.
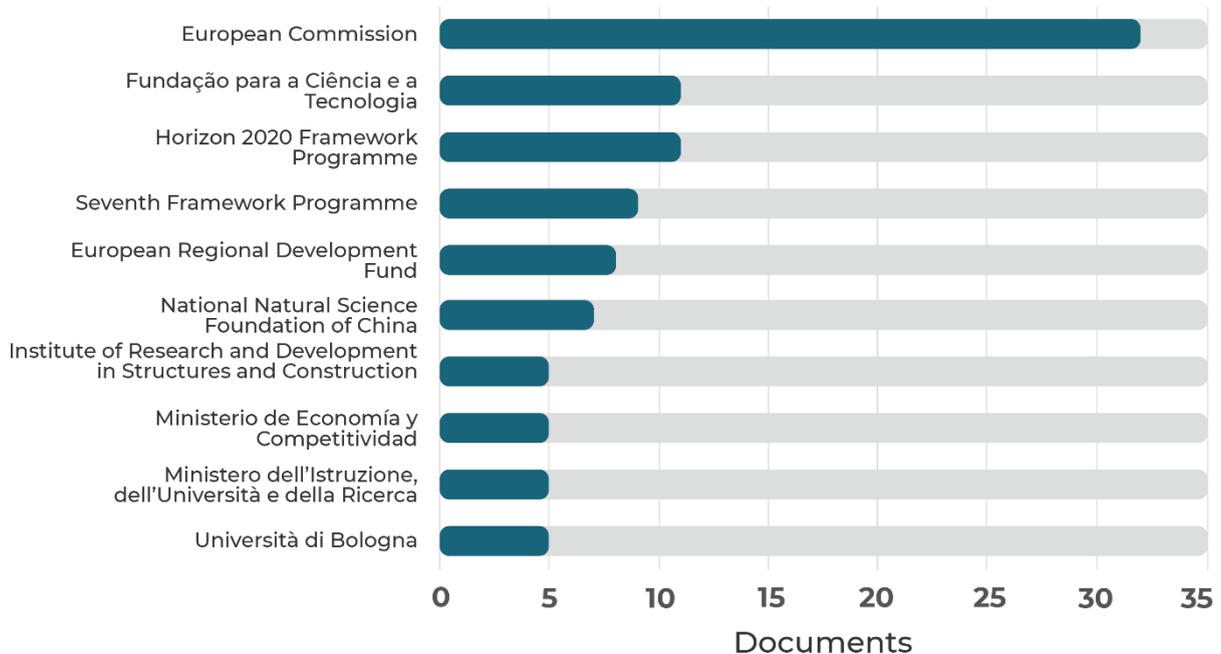
Figure 3 - Main 15 funding sponsor on Risk Management on Cultural Heritage (Source: Scopus)

The research of **technical report and grey literature** was oriented towards examining the documents of the main European and worldwide governmental (European Commission, European Parliament, European Environmental Agency, UNESCO) and non-governmental institutions (ICCROM, ICOMOS, DM UCH) involved in cultural heritage management with particular regard to the effects of climate change. The desk research is conducted and supported by all the partners of the CHARISMA project through the compilation of a survey aimed at identifying reports, handbooks, and technical guidelines organised and structured by reference institution, type of risk and cultural heritage specifications. The analysis of grey literature has provided more insights into the concept of cultural heritage and to draw up a list of environmental risks that threaten its integrity and conservation.

The research and analysis of **European projects** represent an in-depth study of scientific literature aimed at identifying and completing the state of knowledge on applied and validated solutions and methodologies for the management of cultural heritage. Information on European projects was collected from the CORDIS portal to frame themes, objectives, case studies, and project status (ongoing or closed).

## Task 1.2 Target group: Stakeholder map

WP1 has further refined and tailored such desk work, with the coordinated support of all partners, to perform a "target group" tailored analysis of the "knowledge and market base" of the "Risk Manager for Cultural Heritage" trained professionals.

The methodological procedure followed for the identification and recognition of cultural heritage institutions is essentially based on the guided collection of data relating to stakeholders in terms of (1) name of institution/organisation; (2) profile; (3) mission; (4) cultural heritage of reference; (5) related risks.

## Task 1.3 Assessment of current situation: legal framework

An extended mapping has been performed of both knowledge and organisations/institutions (both public and private) in order to assess the current situation (plans developed, legislative frameworks, etc.) about risks management related to climate change for each category mapped in each targeted Country.

The reconstruction of the legal framework completes the desk research activity by providing regulatory references for the management of cultural heritage and risk mitigation in Europe. The activity carried out with the coordinated collaboration of all partners aims to provide a framework on two levels: European and national. The first order describes the framework of the EU directives while the second offers an overview of the regulations in force at national level in the field of cultural heritage and the environment.

The mapping and classification of cultural heritage at risk completes the assessment in order to obtain a general view of the types of risk linked to climate change and their location in the targeted countries.

In light of the data and information collected and analysed during the desk research, this report presents a review of the results according to the following structure: Section 2 provides an overview of existing scientific evidence and key concepts such as cultural heritage, climate change and risk management. Section 3 focuses its attention on the current situation on the legal framework in targeted countries to safeguard cultural heritage under threat. In section 4 a mapping of cultural heritage at risk will be provided in order to localise risks pending on cultural heritage in Italy, Austria, Germany, and Czechia. Section 5 resumes the results of the stakeholder map analysing typologies and characteristics of potential institutions to be involved. Finally, section 6 provides an overview on EU-funded projects.

The structure of the report, here illustrated, aims to focus attention on the management of cultural heritage in the context of climate change by defining the starting epistemological and operational field for the training of risk managers.

## 2. Existing scientific evidence and key concepts: cultural heritage, climate change, and risk management

Both climate action and safeguarding cultural heritage from climate impacts and other hazards are highly relevant topics, gaining increasing attention at the international level.

Answering to goals of task 1.1, this section includes the results of the desk review listing the selected and reviewed scientific literature, international reports and handbook guides and highlighting the most relevant findings regarding the topic of risk management in relation to climate change impacts on tangible cultural heritage and other threats for cultural heritage in Europe.

The overall objective of this section is to provide an overview of the state of the art in the field of cultural heritage and risk management with a specific focus on climate change related threats to European cultural heritage.

### Cultural heritage definition

The term "cultural heritage" is a constantly evolving concept that has a different meaning for different groups of people and communities (Garcia, 2021).

The present Study is based on the approach to cultural heritage shared in Europe and promoted by both European Union institutions and the Council of Europe.

In particular, the Council of the **European Union (EU)** defines cultural heritage as "the resources inherited from the past in all forms and aspects - tangible, intangible and digital (born digital and digitised), including monuments, sites, landscapes, skills, practices, knowledge and expressions of human creativity, as well as collections conserved and managed by public and private bodies such as museums, libraries and archives." (Art. 2, EU Council conclusions of 21 May 2014 on cultural heritage as a strategic resource for a sustainable Europe (2014/C 183/08). The Council of the EU highlights that the cultural heritage concept includes tangible, intangible and digital resources that originate "from the interaction between people and places through time and it is constantly evolving" putting people in the centre of the concept.

A similar approach to cultural heritage is fostered by the **Council of Europe** that introduced the first comprehensive legal definition of cultural heritage in the Convention on the Value of Cultural Heritage for Society of 2005 (Faro Convention). According to Article 2 of the Faro Convention, cultural heritage *is a group of resources inherited from the past which people identify, independently of ownership, as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions; it includes all aspects of the environment resulting from the interaction between people and places through time.*

At the international level, more recently, both **UNESCO** and **ICOMOS** share the vision of cultural heritage that includes both tangible and intangible heritage. For instance, since 1972, the **UNESCO**'s concept of cultural heritage has been expanded to include underwater heritage, cultural landscapes (as a special category of sites), historic urban landscapes, intangible cultural heritage, movable tangible cultural heritage (paintings, sculptures, coins, manuscripts), digital and audiovisual heritage.

This Study focuses on the analysis of risk management and assessment of cultural heritage across Europe, with a particular focus on climate change related risks. Although the present Study focuses on tangible heritage, it acknowledges the threats posed by climate change to intangible heritage.

## Climate change impacts to cultural heritage and related concepts

Even though the scale of climate change impacts on cultural heritage is uncertain, it represents one of the most serious and, moreover, the fastest growing threats (Markham, The Union of Concerned Scientists, 2018) that leads to changes in climate patterns with serious impacts from social, environmental and economic points of view.

According to the **UNESCO State of Conservation Report**, 62 World Cultural Heritage Sites from 46 countries are currently at risk due to climate change impacts[1]. Although climate change has an impact also on other categories of cultural heritage, not only heritage included in different national or international protected lists.

The **ICOMOS** study concerning the interlinkages between cultural heritage and climate change lists the following climate related threats to different categories of cultural heritage: "increased temperature; changed freeze or thaw cycles; permafrost thaw, increased water vapour content in the air (leading to changes in

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[1]

https://whc.unesco.org/en/soc/?action=list&pattern=&sitescategory=1&soc_start=&soc_end=&id_threats=244%2C130%2C129%2C128%2C127%2C126%2C131&fullsearch=&otherthreats=

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relative humidity in combination with temperature change); increased wind; climate influenced wildfires; changes in seasonality and phenology, spread of invasive species and pests, changes in range and distribution and populations of species; less precipitation/drought; desertification; increased precipitation and more intense rainfall events; acute coastal, estuarine and freshwater flooding events; intensified storms, including hurricanes and cyclones, and storm surge; increased coastal erosion; rising water table; salt water intrusion; ocean acidification (direct impact of increased $CO_2$)" (ICOMOS, 2019).

The **Intergovernmental Panel on Climate Change** (hereinafter – "IPCC") defines **climate change** as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer" (IPCC, 2018). In accordance with the IPCC conceptual framework, climate change may be caused by both natural processes and by human activities.

The **United Nations Framework Convention on Climate Change** (hereinafter "UNFCCC") makes a distinction between climate variability occurring due to natural processes and climate change intended as a human-induced process. The **UNFCCC** considers only human-induced climate change and defines it as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (Article 1).

Although the IPCC and the UNFCCC use different definitions, they agree that "the human influence on the climate seems likely to push the planet into a climate regime that humanity has not experienced before, although it is not as extreme as the planet has witnessed in the past long before humanity existed." (Kelman, 2015).

The potential impacts of climate change are especially associated with **climate extremes** and **climate-related hazards**, particularly floods and storms, that are intensifying and becoming more frequent. Climate extremes are defined by the **IPCC** as "the occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable" (IPCC, 2018). Commonly both extreme weather and extreme climate events are jointly referred to as climate extremes (IPCC, 2018).

For the purposes of its report, the **IPCC** further distinguishes "Extremes of atmospheric weather and climate variables" (such as precipitation, temperature, wind) and "Impacts on the Natural Physical Environment" (such as droughts, floods, extreme sea level, waves, and coastal impacts, as well as other physical impacts, including cryosphere-related impacts, landslides, and sand and dust storms). The **impacts** on the natural physical environment depend not only on variations in a single atmospheric weather and climate variable, but are usually the

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result of specific atmospheric and surface conditions. For instance, both floods and droughts are related to precipitation extremes, but are also impacted by other atmospheric and surface conditions. Moreover, the **IPCC** stresses that the severity of the impacts of climate extremes on natural and human systems strongly depends on the level of the exposure and vulnerability to these extremes. The exposure and vulnerability are dynamic and can differ due to a wide range of factors (economic, social, geographic, demographic, cultural, institutional, governance and environmental).

According to the **IPCC**, the impacts are considered **disasters** if "they produce widespread damage and cause severe alterations in the normal functioning of communities or societies" (IPCC, 2018). Thus, climate extremes are not disasters themselves but could contribute to disasters in particular conditions. The definition of a disaster used by **IPCC** is as follows: "severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery." (IPCC, 2018).

The **United Nations Office for Disaster Risk Reduction (UNDRR)** defines a disaster as "a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts" (**UNDRR**).

Other important risk management concepts are as follows:

- **hazardous event**, intended as "the manifestation of a hazard in a particular place during a particular period of time"[2];
- **hazard** generally defined as "a process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation"[2];
- **exposure** means "the presence of people; livelihoods; environmental services and resources; infrastructure; or economic, social, or cultural assets in places that could be adversely affected" (IPCC, 2018);
- **vulnerability** means "the propensity or predisposition to be adversely affected" (IPCC, 2018).

In accordance with the **UNDRR** approach, hazards could be biological, environmental, geological, hydrometeorological and technological processes and phenomena. However, following this approach, the term does not include the

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[2] UNDRR, https://www.undrr.org/terminology

occurrence or risk related to the armed conflicts and other situations of social instability or tension. UNDRR identifies the following **categories of hazards**:

- **Natural hazards**, predominantly associated with natural processes and phenomena.
- **Anthropogenic** (or human-made) **hazards**, entirely or predominantly induced by human activities and choices.
- **Socionatural hazards**, associated with a combination of natural and anthropogenic factors.

**IPCC** developed the following definitions of the terms "risk assessment" and "risk management":

- **Risk assessment** is "the qualitative and/or quantitative scientific estimation of risks" (IPCC, 2018);
- **Risk management** means "plans, actions, strategies or policies to reduce the likelihood and/or consequences of risks or to respond to consequences"(IPCC, 2018).

Both **IPCC** and **UNDRR** conceptual frameworks are in line with the contemporary understanding of the **disaster risk** and **disaster** concepts, expressed within the Sendai Framework, based on the idea that disasters - even triggered by "a hazardous event" - are mostly a "social construction" and the result of social choices, activity or inaction.

The **IPCC** defines "**Disaster risk management**" (hereinafter - "**DRM**") as "processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, and sustainable development" (IPCC, 2018).

According to **UNDRR**, **disaster risk reduction** aims "at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development." (**UNDRR**)

## Desk review

The reviewed international reports, handbook and training guides, and scientific literature are listed in **Tables 1, 2 and 3** respectively. In order to facilitate further study of the listed reports, handbook guides and scientific papers, each document in the tables is classified as having "**very high**", "**high**", "**medium**" and "**low**"

relevance with respect to the topics of risk management, cultural heritage and risk management for cultural heritage according to the following criteria:

- "**Very high**" - if the risk management, cultural heritage or risk management for cultural heritage is the main topic for the document;
- "**High**" - if the document contains important information on the topic of risk management, cultural heritage or risk management for cultural heritage;
- "**Medium**" - if the document contains some relevant information on the topic of risk management, cultural heritage or risk management for cultural heritage;
- "**Low**" - if the document includes a little or does not include any relevant information on the topic of risk management, cultural heritage or risk management for cultural heritage.

The results of the desk review confirm that in recent years the impact of climate change on cultural heritage has attracted increasing attention from both international organisations and researchers.

## International reports and handbook guides

There are various governmental and non-governmental organisations involved in the work on the preservation of cultural heritage under threat from natural and man made hazards and the effects of climate change.

Among the organisations working on these topics at international level there are UNESCO, UNDRR, ICOMOS, UNEP, ICCROM, IUCN. Recently, cooperation between the IPCC and cultural heritage organisations has been intensified.

Regarding the **European level**, the EU (the **European Commission** and the **European Parliament**), the Council of Europe and Europa Nostra are working actively on the issues related to cultural heritage preservation.

For the purposes of this study we reviewed 16 international reports listed in **Table 1** which are relevant for the topic of risk management and assessment for cultural heritage. Half (8) of the reviewed reports specifically focus on the climate change related hazards.

### Worldwide

At the **global level**, various international reports have been published on the hazards associated with climate change, as well as other natural and human made hazards.

The work on the topic of climate change impacts on cultural heritage, promoted by UNESCO since the 2000s, in recent years has been continued and intensified.

The UNESCO World Heritage Committee officially recognized climate change as a threat to the World Heritage Sites (WHS) in 2005 in its Decision 29 COM 7B.a. After the decision, a report on predicting and managing the impacts of climate change on World Heritage was issued, along with a strategy for risk reduction for the world heritage (UNESCO, 2007). The report was followed by a policy document on this topic (UNESCO, 2008). Work on updating this policy document launched in 2019.

In December 2020, ICOMOS declared a climate emergency and called for an urgent collective action on safeguarding heritage from climate change through pathways for limiting global warming to 1.5°C (Resolution 20GA/15 - Cultural Heritage and the Climate Emergency). A year before, in 2019, ICOMOS published the report "The Future of Our Past: Engaging Cultural Heritage in Climate Action" which describes the effects of climate change on cultural heritage and a possible contribution of the heritage sector to climate action, through risk management, adaptation and resilience strategies (ICOMOS, 2019).

The most recent international report regarding this topic at the global level is released in 2022, as a result of the collaboration of ICOMOS, UNESCO and IPCC. It highlights that climate change is already affecting different kinds of heritage around the world (ICOMOS, 2022).

Some other important global reports relevant for the risk management for cultural heritage relate to natural and human made hazards in general. The World Bank published a report summarising international experience, best practices and lessons learned in relation to disaster resilience of cultural heritage, that includes as well recommendations for policy makers and practitioners (World Bank, 2017). A joint publication by UNISDR, ICOMOS-ICORP, UNESCO and ICCROM entitled "Heritage and Resilience – Issues and Opportunities for Reducing Disaster Risks" examines the role of cultural heritage in disaster risk reduction and introduces various approaches to protect heritage.

**Europe**

Similarly to a global scale, at the European level, the impacts on cultural heritage associated with climate change-related hazards are on the agenda of various European organisations.

The recent report "Strengthening cultural heritage resilience for climate change: where the European Green Deal meets cultural heritage" published by the European Commission investigates the interlinkages between culture, heritage and climate change within the framework of the European Green Deal. The report highlights that "cultural heritage is under attack from climate change at an unprecedented speed and scale" (EC, 2022). It also states that "EU Member States do not have proper policies and action plans in place to mitigate these attacks, nor

does the EU" though "A total of 83 best practice examples collected from 26 countries demonstrate the potential of cultural heritage solutions in the context of climate change". It also specifies that "Awareness of the vulnerability of cultural heritage and the increasing threats posed by climate change to European heritage is still very low in the heritage community and even lower in wider society and at the political decision-making level." The report contains 10 recommendations produced by the open method of coordination (OMC) expert group.

The relevance of the topic is confirmed by the recently released report "**Cultural Heritage and Climate Change: New challenges and perspectives for research**" by JPI CH and JPI Climate identifies research gaps and priorities in the field of cultural heritage, climate change, climate adaptation and mitigation measures (JPI CH and JPI Climate, 2022).

In 2007, the **Council of Europe** released the report "**Vulnerability of Cultural Heritage to Climate Change**" related to the state of the art and recommendations regarding the topic of climate change and cultural heritage and based on the results of the Noah's Ark project.

A report on urban adaptation to climate change in Europe produced by the **European Environment Agency** and issued in 2016 contains useful information regarding the topic of climate change related risks for cultural heritage (EEA, 2016).

The **European Union institutions** are also actively working on the topic of cultural heritage protection from the impacts of natural and human made hazards.

The EU-wide study on Risk assessment and prevention for safeguarding cultural heritage from the effects of natural disasters and threats caused by human action conducted under the Work Plan for Culture (2015-2018) provides a comprehensive overview of the existing knowledge, at the European level, on safeguarding cultural heritage from the effects of natural and human made hazards. It revealed that cultural heritage is not considered a risk management priority and this fact impacts negatively on safeguarding cultural heritage in emergency situations (European Commision, 2018).

"**Heritage at Risk: EU research and innovation for a more resilient cultural heritage**" by the European Commission showcases the results of the FP7 and H2020 projects in the field of cultural heritage, its preservation and sustainable management (European Commision, 2018). The same year, another report was released by the European Parliamentary Research Service with regard to the EU policies and funding programmes related to cultural heritage and its safeguarding (European Parliamentary Research Service, 2018).

The report "Mapping of Cultural Heritage actions in European Union policies, programmes and activities" is a useful source regarding the EU policies, funding programmes and other programs and activities in the field of cultural heritage.

In 2007, the European Parliament published a study entitled "Protecting the cultural heritage from natural disasters" focusing on national and international instruments and activities related to cultural heritage preservation from natural hazards, analysing best practices and problems regarding the topic.

## (Climate) resilient cultural heritage and sustainability issues

Recently, the value and the importance of cultural heritage for sustainability issues has attracted increasing attention at international and European levels as well.

The findings of two reports of Europa Nostra (2021) and ICOMOS (2019) underline the potential contribution of cultural heritage to climate action and green transition, fostering both the value of cultural heritage and the urgent need of cultural heritage protection from climate impacts.

The ICOMOS report states that cultural heritage, both tangible and intangible, is an important climate asset which in particular could be used as a communication tool about climate change threats and raising awareness on the urgency and importance of climate action at local, national and international levels.

The "Putting Europe's shared heritage at the heart of the European Green Deal" (European Heritage Green Paper) produced by Europa Nostra in cooperation with ICOMOS and the Climate Heritage Network regards the role of heritage in climate action and green transition within the framework of the European Green Deal. It highlights the high relevance of the cultural heritage sector for the achievement of the European Green Deal objectives.

Previously, in 2016, the Horizon 2020 Expert Group on Cultural Heritage released a report "Getting cultural heritage to work for Europe'' highlighting the benefits of cultural heritage from economic and environmental points of view, its contribution to social cohesion and sustainable development.

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Table 1 – International reports relevant for the topic of risk management for cultural heritage

| Title | Institution | Year | Risk(s) | Domain | Category of CH | Relevance for RM | Relevance for CH | Relevance for CH+RM |
|---|---|---|---|---|---|---|---|---|
| *Cultural Heritage and Climate Change: New challenges and perspectives for research* | JPI CH and JPI Climate | 2022 | climate change related risks | Europe | not specified | high | high | very high |
| *Impacts, Vulnerability and Understanding risks from Climate Change to Culture and Heritage* | ICOMOS | 2022 | climate change related risks | Worldwide | not specified | high | high | very high |
| *STRENGTHENING CULTURAL HERITAGE RESILIENCE FOR CLIMATE CHANGE* | European Commission | 2022 | climate change related risks | Europe | cultural heritage | high | high | very high |
| *Putting Europe's shared heritage at the heart of the European Green Deal (European Heritage Green Paper)* | Europa Nostra, ICOMOS, Climate Heritage Network | 2021 | climate change related risks | Europe | not specified | low | very high | medium |
| *The Future of Our Past: Engaging Cultural Heritage in Climate Action* | ICOMOS | 2019 | climate change related risks | Worldwide | not specified | medium | very high | high |
| *Safeguarding cultural heritage from natural and man-made disasters. A comparative analysis of risk management in the EU* | European Commission | 2018 | natural and man-made hazards, climate change related risks | Europe | not specified | high | high | very high |
| *Heritage at Risk: EU research and innovation for a more resilient cultural heritage* | European Commission | 2018 | climate change related risks and natural risks | Europe | not specified | high | high | very high |
| *Cultural heritage in EU policies* | European Parliamentary Research Service | 2018 | not specified | Europe | tangible and intangible | medium | very high | medium |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Promoting Disaster Resilient Cultural Heritage* | World Bank | 2017 | natural risks | Worldwide | not specified | high | high | very high |
| *Mapping of Cultural Heritage actions in European Union policies, programmes and activities* | European Commission | 2017 | natural risks and risks related to man-made hazards, climate change related risks | Europe | tangible and intangible | medium | high | medium |
| *Urban adaptation to climate change in Europe, Transforming cities in a changing climate* | European Environment Agency | 2016 | climate change related risks | Europe | not specified | high | medium | medium |
| *Getting cultural heritage to work for Europe* | European Commission | 2015 | not specified | Europe | tangible and intangible | low | very high | medium |
| *Heritage and Resilience – Issues and Opportunities for Reducing Disaster Risks* | UNISDR / ICOMOS-ICORP / UNESCO / ICCROM | 2013 | natural and man-made hazards, climate change related risks | Worldwide | tangible and intangible | high | high | very high |
| *Vulnerability of Cultural Heritage to Climate Change* | Council of Europe | 2008 | climate change related risks | Europe | not specified | high | high | very high |
| *Climate Change and World Heritage* | Unesco | 2007 | climate change related risks | Worldwide | World heritage | high | high | very high |
| *Protecting the cultural heritage from natural disasters* | European Parliament | 2007 | natural risks | Europe | movable and immovable | high | high | very high |

## Handbook (training) guides

During the study we reviewed several handbook and training guides on the topic of risk management for cultural heritage. They are sources of important knowledge on risk management methods for safeguarding cultural heritage though only one of them mentions climate related risks and only in relation to the World Heritage Sites.

In 1998, International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) published a manual on risk preparedness in the context of World Heritage convention. The manual highlighted the need of enhancing the management skills of the staff responsible for World Heritage sites and improving the capacities of cultural heritage professionals on all levels. One of the primary objectives of the manual was to provide cultural heritage managers with guidelines on developing site-specific risk-preparedness plans, adapted to a particular local context.

Two other handbook guides are joint publications of the Canadian Conservation Institute (CCI) and ICCROM issued in 2016 and related to "The ABC method", an innovative risk management approach to the preservation of cultural heritage developed as a result of collaboration of ICCROM with its international partners focusing on a "paradigm shift from traditional preventive conservation to an approach based on risk management".[3]

Another useful source for the topic of cultural heritage protection is "Managing Disaster Risks for World Heritage" published by UNESCO, ICCROM, ICOMOS, IUCN. It is a manual with the guidelines for the managers of the cultural and natural World Heritage sites in reducing the risks to these sites from natural and human-made hazards.

Research Center for Disaster Mitigation of Urban Cultural Heritage,Ritsumeikan University (RitsDMUCH) also published a training guide for the courses in disaster risk management for urban cultural heritage.

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[3] ICCROM, Risk management for preventive conservation
(https://www.iccrom.org/section/preventive-conservation/risk-management-preventive-conservation)

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Table 2 – Handbook / training guides on risk management for cultural heritage

| Title | Main author | Institution | Year | Risk(s) | Domain | CH Category | Relevance for RM | Relevance for CH | Relevance for CH+RM |
|---|---|---|---|---|---|---|---|---|---|
| *The ABC method - A risk management approach to the preservation of cultural heritage* | Michalski | ICCROM, Canadian Conservation Institute | 2017 | not specified | Worldwide | not specified | high | high | very high |
| *A guide to risk management of cultural heritage* | Pedersoli jr. | ICCROM | 2016 | not specified | Worldwide | not specified | high | high | very high |
| *Disaster Risk Management of Cultural Heritage in Urban Area* | Jigyasu | Research Center for Disaster Mitigation of Urban Cultural Heritage, Ritsumeikan University (RitsDMUCH) | - | not specified | Worldwide | urban cultural heritage | high | high | very high |
| *Managing Disaster risks for World Heritage* | Vujicic-Lugassy | UNESCO, ICCROM, ICOMOS, IUCN | 2010 | natural and man-made hazards, climate change related risks | Worldwide | World heritage | high | high | very high |
| *Risk Preparedness: a Management Manual for World Cultural Heritage* | Stovel | ICCROM | 1998 | not specified | Worldwide | World cultural heritage | high | high | very high |

## Scientific literature

**General overview: topics, geographical domain, categories of cultural heritage and risk types**

For the purposes of this study we selected and reviewed 34 scientific papers listed in Table 3. The reviewed papers concern the following topics:

1) Methods and tools for risk assessment and management: general for risk management and specific ones for the cultural heritage field;
2) Climate change mitigation and adaptation strategies for cultural heritage;
3) Participatory approaches for cultural heritage protection and community resilience;
4) Categories of hazards and risks impacting cultural heritage;
5) Review of common indicators for risk assessment and management;
6) Policy and legal framework: general for risk management and specifically regarding the protection of cultural heritage.

The geographical domain of the topics and case studies of selected papers are as follows:

- Worldwide - 15 papers;
- Europe or parts of Europe (Central Europe) - 3 papers;
- Italy - 9 papers;
- Germany - 2 papers;
- Spain - 2 papers;
- Portugal - 2 papers;
- United Kingdom - 3 papers;
- Scotland - 1 papers;
- Norway - 3 papers.

### Categories of cultural heritage

The reviewed papers relate to various types of cultural heritage, including the World Heritage sites, urban heritage, in particular such categories of immovable heritage as historic buildings, buildings of higher education institutions, churches and cathedrals, other types of built heritage, monuments and sites, archeological heritage and cultural landscapes. Some studies concern tangible (both movable and immovable) cultural heritage in general, some of them do not specify explicitly the category of cultural heritage.

### Categories of risks and hazards for cultural heritage

There are different typologies of risks and hazards impacting cultural heritage analysed in the scientific literature, such as climate change related risks, natural

risks, flood risks, geological risks, earthquakes, air pollution and environmental impacts, fire risks, multi-hazards.

## Climate change related risks

The impacts of climate change which pose serious threats to heritage, in particular the one located in historic urban areas, are the focus of several of the reviewed articles. Twelve of the reviewed papers have a specific focus on the climate related risks (Quesada-Ganuza et al., 2021; Dastgerdi et al., 2019, 2020; Sesana et al., 2018, 2019a, 2019b, 2020, 2021; Sardella et al., 2020; Akturk et al., 2021; Porrini et al., 2021; Cacciotti et al., 2021) on a global, European and national scale (Italy, UK, Scotland, Norway).

The papers concerning a **global scale** mainly relate to World Heritage sites, cultural landscapes, urban and, more generally, tangible heritage. Quesada-Ganuza et al. (2021) explores climate change risks that threaten urban heritage (sea-level rise, an increasing frequency and intensity of natural hazards such as storms, heatwaves and other extreme events) and relevant vulnerability assessment methodologies that follow the IPCC approach. Dastgerdi et al. (2019) analyses the climate-resilience policies and the climate change impacts on the World Heritage Sites. Sesana et al. (2021) provides an overview of climate change impacts on tangible cultural heritage. Akturk et al. (2021) analyses the concept of cultural landscapes, a regulatory framework for enhancing climate resilience of cultural landscape and the related barriers.

The papers of a **European scale** relate to tangible cultural heritage. Sardella et al. (2020) explores the topic of risk mapping and assessing the potential impacts of climate extremes through a Web GIS tool. Sesana et al. (2018) focuses on climate change adaptation strategies for cultural heritage.

## Natural risks

Two of the reviewed papers focus on management of natural risks. An article by De Masi et al. (2020) regards insurance as a risk management instrument for cultural heritage in Italy. Durrant et al. (2022) concerns mapping disaster risk management governance worldwide.

## Flood risks

Three of the reviewed papers focus specifically on the topic of methods and tools for risk assessment and management regarding flood risks in Germany, Spain and Portugal. In particular the reviewed papers relate to the flood risk assessment at large (Figuereido et al., 2019) and regional scale (Garrote et al., 2020) and the regulatory framework related to the floods risk assessment (Hartmann, 2014). A

paper by Hartmann et al. (2014) regards the flood risk assessment, not related specifically to heritage but it provides very useful insights relevant for cultural heritage protection from flood risks.

### Geological hazards

Cigna et al. (2018) focuses on geological hazard assessment for World Heritage sites.

### Earthquakes

With regard to earthquakes, Marra et al. (2021) lists the tools and techniques for proactive conservation plans and provides SWOT analysis for effective decision-making for safeguarding Italian urban cultural heritage, including architectural heritage (historic buildings).

### Fire risks

Four of the reviewed papers have a specific focus on the fire risks on a global scale (Salazar et al., 2021; Marrion, 2016) and national scale (Quapp et al., 2020 and Ferreira et al., 2016 in Germany and Portugal respectively). Marrion (2016) paper is dedicated to the topic of disaster risk management in the field of protection of cultural heritage, in particular to the risk informed approach for protection of immovable cultural heritage. Salazar et al. (2021) focuses on the indicator-based methods for fire risk assessment related to built heritage. Quapp et al. (2020) analyses the German regulatory framework regarding the protection of built heritage from fire risk. Ferreira et al. (2016) paper concerns emergency planning GIS tools regarding protection of urban heritage from fire risks and fire risks assessment methodologies in Portugal.

### Air pollution and environmental impacts

Vidal et al. (2021) provides an overview of environmental and air pollution impacts on urban built heritage.

### Multi-hazards (Earthquakes, flood, landslides, fire risks)

Several articles on the methods and tools for risk assessment and management pay attention to different categories of risks and a multi-hazards approach for risk management. Iadanza et al. (2021) focuses on tools for risk mapping for landslides and floods in Italy, not related specifically to cultural heritage. Ferreira et al. (2022) provides an analysis of main natural risks for urban areas (earthquakes, flood, fire risks) at the global level and lists risk assessment tools, including GIS and other digital tools, and methodologies for urban built heritage. Julià et al. (2021) also focuses on urban heritage and multi-hazard (earthquakes, flood, fire risks)

vulnerability and risk assessment methodologies for historic urban areas at the global level.

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Table 3 - List of relevant scientific papers on risk management for cultural heritage topic

| Title | Main author | Year | Risk(s) | Domain | Category of CH | Relevance for RM | Relevance for CH | Relevance for CH+RM |
|-------|-------------|------|---------|--------|----------------|------------------|------------------|---------------------|
| Using Organigraphs to Map Disaster Risk Management Governance in the Field of Cultural Heritage | Durrant | 2022 | natural risks | Worldwide | not specified | high | high | very high |
| Assessing and Managing Risk in Historic Urban Areas: Current Trends and Future Research Directions | Ferreira | 2022 | earthquakes, flood, fire risks | Worldwide | urban heritage, built heritage | high | high | very high |
| Do we know how urban heritage is being endangered by climate change? A systematic and critical review | Quesada-Ganuza | 2021 | climate change related risks | Worldwide | urban heritage | very high | very high | very high |
| Integrating nature-based solutions and the conservation of urban built heritage: Challenges, opportunities, and prospects | Coombes | 2021 | not specified | Worldwide | urban cultural heritage; built heritage | high | high | very high |
| Managing climate change risk: the case of the Italian Churches | Porrini | 2021 | climate change related risks, flood risks | Italy | historical buildings, churches | high | high | very high |
| Review of vulnerability indicators for fire risk assessment in cultural heritage | Salazar | 2021 | fire risks | Worldwide | immovable heritage | high | high | very high |
| Climate change-induced disasters and cultural heritage: Optimizing management strategies in Central Europe | Cacciotti | 2021 | flood risks, heavy rain, fire, climate change | Central Europe | tangible cultural heritage | high | high | very high |
| Climate change impacts on cultural heritage: A literature review | Sesana | 2021 | climate change related risks | Worldwide | tangible cultural heritage | high | high | very high |

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|---|---|---|---|---|---|---|---|---|
| The role of information management for the sustainable conservation of cultural heritage | Korro Banuelos | 2021 | not specified | Spain | not specified | high | high | very high |
| Up-to-date challenges for the conservation, rehabilitation and energy retrofitting of higher education cultural heritage buildings | Pereira | 2021 | not specified | Worldwide | cultural buildings; higher-education world heritage sites | medium | high | high |
| On a Rational and Interdisciplinary Framework for the Safety and Conservation of Historical Centres in Abruzzo Region | Marra | 2021 | earthquakes | Italy | urban cultural heritage, including architectural heritage (historic buildings) | high | high | very high |
| IdroGEO: A Collaborative Web Mapping Application Based on REST API Services and Open Data on Landslides and Floods in Italy | Iadanza | 2021 | landslides and flood risks | Italy | not specified | very high | medium | medium |
| From single- to multi-hazard vulnerability and risk in Historic Urban Areas: a literature review | Julià | 2021 | earthquakes, flood, fire risks | Worldwide | urban cultural heritage | high | high | very high |
| Cultural landscapes under the threat of climate change: A systematic study of barriers to resilience | Akturk | 2021 | climate change related risks | Worldwide | cultural landscape | high | high | very high |
| Climate Change and Sustaining Heritage Resources: A Framework for Boosting Cultural and Natural Heritage Conservation in Central Italy | Dastgerdi | 2020 | climate change related risks | Italy | cultural landscapes, WHS | high | very high | high |
| Heritage Protection Regulations in Germany and their Relations to Fire Safety Demands | Quapp | 2020 | fire risks | Germany | built heritage, historical buildings | high | very high | high |
| An integrated approach for assessing the vulnerability of World Heritage Sites to climate change impacts | Sesana | 2020 | climate change related risks | Scotland, Italy, Norway | world heritage sites | high | high | very high |
| A risk-reduction framework for urban cultural heritage: a comparative study on Italian historic centres | Giuliani | 2020 | not specified | Italy | urban cultural heritage | high | high | very high |

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|---|---|---|---|---|---|---|---|---|
| Risk Mapping for the Sustainable Protection of Cultural Heritage in Extreme Changing Environments | Sardella | 2020 | climate change related risks | Europe | tangible cultural heritage | high | high | very high |
| A framework proposal for regional-scale flood-risk assessment of cultural heritage sites and application to the Castile and León Region (Central Spain) | Garrote | 2020 | flood risks | Spain | cultural heritage sites | high | high | very high |
| Cultural Heritage and natural disasters: the insurance choice of the Italian Cathedrals | De Masi | 2020 | natural risks | Italy | built heritage (cathedrals) | high | high | very high |
| Heritage Community Resilience: towards new approaches for urban resilience and sustainability | Fabbricatti | 2020 | not specified | Worldwide | urban cultural heritage | high | high | very high |
| Climate Change Challenges to Existing Cultural Heritage Policy | Dastgerdi | 2019 | climate change related risks | Worldwide | world heritage sites, tangible and intangible heritage | high | very high | high |
| Review of environmental and air pollution impacts on built heritage: 10 questions on corrosion and soiling effects for urban intervention | Vidal | 2019 | air pollution, environmental impacts | Worldwide | monuments and sites; urban built heritage | high | high | very high |
| CULTURAL HERITAGE RISK ANALYSIS MODELS: AN OVERVIEW | Ramalhinho | 2019 | not specified | Worldwide | movable and immovable cultural heritage | high | high | very high |
| Flood risk assessment of cultural heritage at large spatial scales: Framework and application to mainland Portugal | Figuereido | 2019 | flood risks | Portugal | immovable cultural heritage (monuments and sites, archaeological heritage) | high | high | very high |
| Increasing the Resilience of Cultural Heritage to Climate Change Through the Application of a Learning Strategy | Sesana | 2019 | climate change related risks | UK, Italy, Norway | not specified | high | high | very high |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mitigating climate change in the cultural built heritage sector | Sesana | 2019 | climate change related risks | UK, Italy, Norway | built heritage | high | high | very high |
| Geological hazards in the UNESCO World Heritage sites of the UK: From the global to the local scale perspective | Cigna | 2018 | geological hazards | UK | world heritage sites | high | high | very high |
| Adapting Cultural Heritage to Climate Change Risks: Perspectives of Cultural Heritage Experts in Europe | Sesana | 2018 | climate change related risks | Europe | immovable and tangible cultural heritage | high | high | very high |
| Review of cultural heritage indicators related to landscape: Types, categorisation schemes and their usefulness in quality assessment | Sowińska-Świerkosz B. | 2017 | not specified | Worldwide | cultural landscapes | medium | high | high |
| More effectively addressing fire/disaster challenges to protect our cultural heritage | Marrion | 2016 | fire risks | Worldwide | built heritage | high | high | very high |
| Urban fire risk: Evaluation and emergency planning | Ferreira | 2016 | fire risks | Portugal | urban heritage | high | high | very high |
| From flood protection to flood risk management: Condition-based and performance-based regulations in German Water Law | Hartmann | 2014 | flood risks | Germany | not specified | very high | medium | medium |

**Methods and tools for risk assessment and management. General issues**

Some tools for risk assessment and management may be of universal application and highly relevant to the field of cultural heritage protection. Iadanza et al. (2021) showcases the experience of the Italian IdroGEO web platform[4] as a tool for risk mapping, communication and dissemination of information on natural risks with the facilities related to citizen science. The platform has different functionalities that can assist the decision making process in developing "risk mitigation policies, land use planning, preliminary design of infrastructures, prioritisation of mitigation measures, management of civil protection emergencies, and environmental impact assessment"(Iadanza et al., 2021). In particular, the platform includes the tools for navigation, downloading and sharing data, reports of the Italian Landslide Inventory, maps of hazards, relevant risk indicators. One of the important features of IdroGEO that it has the facilities related to citizen science, targeting not only decision makers and professionals, but also citizens. Even though IdroGEO has no specific focus on risk management for cultural protection, it could be a useful tool for heritage professionals in assessing landslide and flood risks.

**Specific methods and tools for risk assessment and management for the cultural heritage field**

A significant part of the studied scientific papers concerns specific risk management methods and tools for the protection of cultural heritage, in particular risk assessment tools. The review of the literature on this topic helped to reveal the core knowledge and skills necessary for the staff working in the field of risk management for cultural heritage, who should have a basic knowledge regarding different current tools, methods and approaches in this field.

According the studied literature in this field at global and European level, the following tools, methods and approaches could be useful for efficient risk management and protection of cultural heritage:

1) Risk assessment tools and methodologies, as follows:
   - Risk informed approach
   - IPCC approach
   - Risk mapping tools, in particular GIS and other digital tools
   - Risk assessment models
   - Multihazard vulnerability and risk assessment methodologies for Historic Urban Areas
   - Historic building information modelling
   - Integrated approach, in particular for vulnerability assessment

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[4] https://idrogeo.isprambiente.it/app/

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- A large (Regional) scale Flood Risk Assessment
2) NBS solutions;
3) Tools for disaster risk management governance;
4) Insurance;
5) SWOT analysis;
6) ICT solutions and decision support tools;
7) Information management.

## Worldwide

According to the studied literature regarding a global scale, the following methods, tools and approaches could be used to manage risks in the field of cultural heritage protection, in particular with regards to urban heritage, especially built heritage located in historic urban areas:

- Risk and vulnerability assessment tools and methodologies, such as multi-hazard vulnerability and risk assessment methodologies for Historic Urban Areas; risk assessment models; GIS and other digital tools; risk informed approach; IPCC approach);
- Historic building information modelling;
- NBS solutions;
- Tools for Disaster risk management governance.

Risk and vulnerability assessment tools and methodologies

*a) Multihazard vulnerability and risk assessment methodologies for Historic Urban Areas*

Julià et al. (2021) presents a literature review on the most relevant multi hazard vulnerability and risk assessment methodologies for Historic Urban Areas with a specific focus on seismic, food and fire risk assessment methodologies. The work also aims to identify indicators of the vulnerability of historic urban areas which are relevant for the multi-hazard approaches.

*b) Risk assessment models*

Risk assessment is an essential step for effective risk management. Ramalhinho et al. (2019) lists and summarises the procedures of different kinds (qualitative, semi-quantitative and quantitative) of risk assessment models applicable to movable and immovable cultural heritage. The paper could be very helpful for heritage professionals such as conservators, curators and others to choose the risk assessment model which is suitable for their needs.

*c) GIS and other digital tools*

Ferreira et al. (2022) focuses on the topic of risk management in historic urban areas and existing methodologies for risk and vulnerability assessment which are the most suitable for such areas. The paper highlights the high level of vulnerability of urban areas to natural hazards, mentioning man-made hazards that can also have negative effects on the cities and its heritage. The work refers to the Historic Urban Landscapes (HUL) guidebook produced by Unesco (2016) that includes various strategies for assessing and planning sustainable historic cities. It also provides an analysis of main hazards (earthquakes, fire and floods) for urban areas and risk assessment tools (GIS and other digital tools) and methodologies for urban built heritage emphasising an important role of digital tools that can "facilitate many tasks related to risk identification, assessment and management, such as geometric survey, damage mapping, monitoring, vulnerability assessment, management and more" (Ferreira et al., 2022).

*d) Risk informed approach*

Marrion (2016) concerns the risk informed approach for protection of built cultural heritage (historic buildings) against fire risks that can provide various benefits, in particular such as lower aesthetic impact, the use of traditional materials and skills and local knowledge systems, enhanced awareness of the local community, adoption of effective fire protection provisions, development of maintenance and monitoring strategies for risk reduction.

*e) IPCC approach*

Quesada-Ganuza et al. (2021) analyses climate change risk and vulnerability assessment methodologies for urban areas, in particular a IPCC approach for risk assessment and the IPCC definitions of the terms of risk, hazard, exposure and vulnerability. The main objective of the paper is to provide an overview of the methodologies for assessment of the climate change related risks for historic urban areas. It also provides a brief overview of the current relevant policies at the international (the 2030 Agenda For Sustainable Development, the Sendai framework for Disaster Risk Reduction 2015-2030) and European level (Work plan for Culture 2019-2022) and the ongoing work of Unesco, World Heritage Committee, ICOMOS regarding the topic.

Historic building information modelling for built heritage

Pereira et al. (2021) concerns the historic building information modelling (HBIM) highlighting that "In situ diagnosis and characterization of the current status of the building stock is vital for drawing any intervention strategy".

## Nature-based solutions (NBS) for built heritage

Coombes et al. (2021) investigates the topic of nature-based solutions (NBS) for the conservation of urban built heritage encouraging the view of the built heritage as "a unique opportunity for NbS rather than as a barrier founded on generalised perceptions of nature as a threat to materials, values, and practices". The paper lists the ways in which urban NBS might benefit built heritage conservation showcasing also potential co-benefits and linkages between NBS and built heritage conservation in urban areas. Conservation practices based on NBS could become efficient tools for risk management of cultural heritage. In particular, NBS can contribute to reduced risk of water-related damage to heritage assets and sites.

## Tools for Disaster risk management governance

Durrant et al. (2022) regards mapping of disaster risk management governance in the field of cultural heritage and natural risks using the Organigraph technique as a valuable tool for identifying key cultural heritage stakeholders and experts into disaster risk management within the Sendai Framework for Disaster Risk Reduction.

## Europe

According to the studied literature, the following methods, tools and approaches may be useful for assessing and managing risks in the field of cultural heritage protection in Europe:

- GIS and risk mapping tools;
- Integrated approach, in particular for vulnerability assessment (Italy);
- A large (regional) scale Flood-Risk Assessment (Spain, Italy, Portugal);
- Geological hazards assessment (UK);
- ICT solutions and decision support tools (Central Europe);
- Insurance (Italy);
- SWOT analysis (Italy);
- Information management (Spain).

## Risk and vulnerability assessment tools and methodologies

*a) GIS and risk mapping tools*

Sardella et al. (2020) regards the topic of assessment of the potential impacts of climate extreme events (heavy rain, flooding, and drought) on cultural heritage

through risk mapping tools, including Web GIS. Such tools can contribute to enhancing  through supporting the decision making process.

*b) Integrated approach for vulnerability assessment*

Sesana et al. (2020) promotes an integrated approach for assessing the vulnerability of World Heritage Sites to climate change impacts. In particular, such approaches can be used to implement interventions aimed at contributing to the enhanced climate resilience of cultural heritage. The paper analyses different approaches to assess climate change impacts that can be top-down, bottom-up or integrated. The last one includes elements of top-down and bottom-up approaches, and it also uses local knowledge in the vulnerability assessment process. The integrated approach consists of the 5 steps as follows: "i) Understanding the values of the site; ii) Assessing the impacts of climate change on cultural heritage at the national and / or regional level; iii) Assessing the impacts of climate change on cultural heritage at the local scale; iv) Assessing the vulnerability; v) Repeat periodically" (Sesana et al., 2020).

## Central Europe

### ICT solutions and decision support tools

Cacciotti et al. (2021) provides an analysis of risk management tools and strategies for tangible cultural heritage protection in climate change scenarios against floods, heavy rain and fire. In particular, the paper concerns the ICT and decision support tools (e.g. a web GIS platform and a manual for cultural heritage resilience and a handbook on transnational rescue procedures respectively) resulting from the Interreg Central Europe project ProteCHt2save.

## Spain

### Information management

Korro Banuelos et al. (2021) investigates the role of information management for cultural heritage restoration and conservation and lists international research projects relating to the topic (Horizon 2020 and Horizon Europe). It also includes the definitions of the concepts of cultural heritage conservation and restoration. The paper highlights the cultural heritage value as "powerful engine for economic growth and a valuable resource for social development" (Korro Banuelos et al., 2021).

### Regional-Scale Flood-Risk Assessment

Garrote et al. (2020) introduces a methodological framework of the Regional-Scale Flood-Risk Assessment of Cultural Heritage Sites and their elements that can be used to categorise the risks and identify the flood risk level with respect to each

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cultural heritage. The framework is based on two tools as follows: i) the creation of a GIS database that allows to identify the relationship between the cultural heritage assets and the flow-prone areas for different flood return periods; ii) the creation of a risk matrix regarding both the flood hazard (return period, flow depth, and river flooding typology) and the flood vulnerability.

## Italy

### Insurance for management of climate change related and other natural risks

Porrini et al. (2020) showcases an interesting case study of managing climate change related risks for churches in Italy through insurance. In accordance with the paper, "through a national policy undertaken with an insurance company, all churches are now covered from the risk of natural disasters and climate-related events". It underlines that insurance can be a relevant tool for risk management and can play an important role in making cultural heritage more resilient. The article concerns also the Value-belief-norm approach for risk management decision making.

De Masi et al. (2020) investigates the topic of the use of insurance for development of the risk management strategy for built cultural heritage with regards to natural risks. The work also focuses on the case of the Italian cathedrals.

### A large scale methodology risk assessment and integrated approach for disaster risk management for urban cultural heritage

Giuliani et al. (2020) focuses on a large-scale methodology for risk assessment and an integrated approach for disaster risk management in the field of cultural heritage.

### SWOT analysis for protection of urban heritage

Marra et al. (2021) suggests SWOT analysis as an effective decision-making tool and investigates the tools and techniques for proactive conservation plans with regard to the urban heritage protection against earthquakes.

### A large scale methodology flood risk assessment in Portugal

Figuereido et al. (2019) concerns the flood risk assessment at large scale with regard to immovable tangible heritage. The work introduces a novel framework for semi-quantitative risk assessment for immovable cultural heritage at large scale. The framework can assist to perform a preliminary risk assessment for a large number of heritage assets and identify the ones that need more detailed risk assessment.

<u>Geological hazards assessment in the United Kingdom</u>

Cigna et al. (2018) concerns geological hazard assessment for the World Heritage Sites located in the United Kingdom. It also contains the review of geological hazards from global and European scale studies and based on nationwide datasets.

## Climate change mitigation and adaptation strategies for cultural heritage

The topic of climate change mitigation and adaptation strategies for heritage is explored in Sesana et al., 2018, 2019a, 2019b.

Sesana et al. (2018) summarises the climate change adaptation strategies in Europe for tangible and in particular immovable cultural heritage, by examining the knowledge of the cultural heritage preservation experts regarding the topic and identifying relevant best practices and methodologies for cultural heritage climate adaptation.

Sesana et al. (2019b) focuses on the perceptions and awareness of the cultural heritage community of the risks and impacts of climate change on cultural heritage through case studies in three countries: Italy, Norway and the UK. The paper highlights the importance of dissemination of knowledge regarding climate change impacts in order to increase awareness of decision makers on this topic, and enhance climate change adaptation of the cultural heritage sector. Though, the lack of communication between academic and management sectors is identified. According to Sesana (2019b), a double loop learning process can assure the better design of effective adaptation measures and strategies. This learning mechanism can also be used to implement preventive measures contributing to the enhanced resilience of cultural heritage sites.

Sesana et al. (2019a) explores the topic of climate change mitigation strategies in the built cultural heritage sector in the UK, Italy and Norway and the related enablers and barriers. According to Sesana et al. (2019a) the built heritage can significantly contribute to GHG emission reduction, even though it is challenging and requires a "strong and concerted action involving research and government" to overcome the existing barriers related to economic issues, regulations, lack of knowledge, among the others. The work also lists the enabling factors such as economic resources and incentives, legislation and regulations, change in user behaviour, and others.

## Participatory approaches for cultural heritage protection and community resilience

Fabbricati et al. (2020) focuses on the topics of community and urban resilience based on the cultural heritage highlighting that in accordance with the recent

policy documents at the global level the community resilience is linked to enhancing the cultural sector and in particular the preservation of cultural heritage.

## Categories of hazards and risks impacting cultural heritage

Vidal et al. (2019) provides a review of environmental and air pollution impacts on built heritage and investigates possible approaches to identify risk areas that need mitigation strategies.

Sesana et al. (2021) provides an overview on the impacts of climate change on tangible cultural heritage, including built heritage, monuments, archeological sites, historical buildings and their interiors and collections. The work focuses on the material effects as a result of changes in the hazard without considering the vulnerability aspects in accordance with the terminology of the Fifth Assessment Report (AR5) Intergovernmental Panel on Climate Change (IPCC, 2014).

## Review of common indicators for risk assessment and management

Salazar et al. (2021) investigates the indicator-based methods for fire risk assessment related to built heritage. Sowińska-Świerkosz (2017) provides an overview of indicators to monitor, manage and protect cultural landscapes.

## Policy and legal framework regarding the risk management

Hartmann (2014) investigates a "paradigm shift from technically oriented flood protection to a holistic approach of flood risk management" and analyses the German regulatory framework for flood risk management, not related specifically to heritage.

## Policy and legal framework regarding the protection of cultural heritage

Some of the reviewed articles deal with the topic of policies and regulations on protection of cultural heritage from climate change impacts and fire risks.

With regard to the topic of climate change, Dastgerdi (2019) concerns climate-resilience policies for heritage sites and climate change impacts on world heritage sites. Akturk (2021) also regards the regulatory framework for enhancing climate adaptation capacity and climate resilience of cultural landscapes and analyses the related barriers. Besides, Dastgerdi (2020) concerns Italian climate adaptation policies for cultural landscapes. In particular it refers to the cultural and natural heritage conservation framework for Central Italy.

As for the fire risks, Quapp (2020) explores German regulations for the protection of heritage from fire risks.

# 3. Safeguarding Cultural Heritage under Threat: current situation on policy and legal frameworks worldwide, in Europe and in targeted countries

This section contains the results of **task 1.3** and provides a summary regarding international, European and national risk management policy and legal frameworks, with a particular focus on climate change and sustainability issues as well as protection of cultural heritage. The subsections concerning local policies in the target countries are based on the inputs provided by all **CHARISMA** partners on the regulations and policies in their countries.

## International law, policies and guidelines

Cultural dimension of sustainable development and the topic of preservation of cultural heritage are gaining increasing attention at international level. **The 2030 Agenda for Sustainable Development** recognizes the significant role of cultural heritage for resilient communities in its Sustainable Development Goal (hereinafter "SDG") 11 as reflected in the target 11.4. ("Strengthen efforts to protect and safeguard the world's cultural and natural heritage"). The importance of cultural heritage and its safeguarding is recognised in the 2015 Sendai Framework for Disaster Risk Reduction (hereinafter "Sendai Framework") and the **UN New Urban Agenda** adopted in 2016 at the UN Conference on Housing and Sustainable Urban Development (Habitat III).

In particular, protection of cultural heritage is one of the priority goals of the **Sendai Framework**, the current global instrument on disaster risk reduction, that has such an indicator as "Direct economic loss to cultural heritage damaged or destroyed attributed to disasters" to assess progress on its implementation. The Sendai Framework has the following priority areas of action: i) Understanding disaster risk in all its dimensions; ii) Strengthening disaster risk governance, in particular through fostering stakeholders engagement in disaster risk management; iii) iv) Investing in disaster risk reduction for resilience; v) Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction.

The Sendai Framework continues the work started with the development of the Hyogo Framework for Action and previous global instruments (the International Strategy for Disaster Reduction of 1999, the Yokohama Strategy for a Safer World of 1994, and the International Framework of Action for the International Decade for Natural Disaster Reduction of 1989), while adding the new elements, including "shift in focus from disaster management to integrated and anticipatory disaster

risk management" and "from managing events to managing the processes which create risk" (UNISDR, "Reading the Sendai Framework for Disaster Risk Reduction 2015 – 2030").

Although climate change was not on the global agenda in 1972 when the UNESCO World Heritage Convention was adopted, the treaty takes climate factors into account as a potential threat to the World Heritage sites. In addition, Article 4 of the 1972 UNESCO Convention foresees the obligation of each Member State to ensure the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage situated in its territory. So far, it is the only convention on protection of cultural heritage that does it.

## Legal and policy framework in the field of risk management for cultural heritage in Europe

At the European level, both the EU institutions and the Council of Europe (CoE) work in the field of preservation of cultural heritage, highlighting its great importance and recognising the role of cultural heritage in sustainable development issues, as explicitly affirmed in the Faro Convention.

### Council of Europe

The main CoE international conventions that sets out a framework for heritage preservation policies are as follows:

1) The Council of Europe Framework Convention on the Value of Cultural Heritage for Society (CETS No. 199, "Faro Convention");
2) the European Landscape Convention (ETS No. 176).

There are also various policy documents issued by the Council of Europe regarding the protection and preservation of cultural heritage. Among them are the following:

- Recommendation 2038 (2014) "Europe's endangered heritage";
- Resolution 1981 (2014) "Europe's endangered heritage";
- Recommendation on the European Cultural Heritage Strategy for the 21st century (2017).

The Parliamentary Assembly of the CoE (PACE) Resolution 1981 (2014) "Europe's endangered heritage" highlights the need for "long-term integrated strategies and coherent policies, including investment plans", to ensure heritage conservation. Among the recommendations to the member states concerning policy implementation, includes the one that relates to revision of "standards and guidelines for heritage maintenance, conservation, restoration and rehabilitation".

Another important recommendation relates to mainstreaming the protection of heritage in decision making, planning and policy at national, regional and local level and the inclusion of "heritage impact assessment" alongside environmental impact assessment. Besides, in the Recommendation 2038 (2014) "Europe's endangered heritage", the PACE calls for the "greater coherency of action between the CoE, the EU and UNESCO at the European level".

The **CoE's Recommendation on the European Cultural Heritage Strategy** for the 21st century adopted in 2017 includes Recommendation K9 ("Develop study and research programmes that reflect the needs of the heritage sector and share the findings") showcasing as an example of actions the "Climate for Culture" project aimed at assessing the impact of climate change on cultural heritage. Another recommendation relevant for the field of risk management is Recommendation D8 ("Protect, restore and enhance heritage, making greater use of new technologies").

Climate change threats to cultural heritage have been the focus of the Council of Europe since 2008. The **Recommendation on Vulnerability of Cultural Heritage** to Climate Change adopted in 2009 by the Committee of Permanent Correspondents of the European and Mediterranean Major Hazards Agreement (EUR-OPA) after the report on this topic commissioned by the CoE and released in 2008, notes that "the deterioration and, in some cases, loss, of cultural heritage would have negative consequences for European and Mediterranean societies, in particular because of its value as a source of identity and livelihood".

**European Union**

Currently, the resilience of cultural heritage is an important issue for different EU wide programmes and initiatives.

With regard to urban and peri-urban cultural heritage, the **Urban Agenda for the EU** provides "Resilience of Cultural and Natural Heritage" as one of the central topics for urban policies based on culture and cultural heritage. It also acknowledges the essential role of urban cultural heritage in improving urban sustainable growth policies in Europe and mentions Culture and Cultural Heritage as key resources of the European city.

The **European Green Deal**, whose central aim is Europe's climate neutrality by 2050, can contribute to the enhanced protection of cultural heritage. At the moment, only two strategies within the European Green Deal directly concern the cultural heritage sector. The new **EU adaptation strategy** as a part of the European Green Deal package recognizes the climate change related impacts on cultural heritage, in particular the climate extremes that can lead to floods making essential the role of the EU Directive on the assessment and management of flood

risks 2007/60/EC (**The Floods Directive**) in the reduction of risks for cultural heritage associated with floods. The second document of the European Green Deal that mentions cultural heritage is the **Renovation wave strategy**, which cites among the fundamental principles of the renovation the respect to the cultural heritage. In addition, the **New European Bauhaus Initiative** as an integral part of the Renovation wave strategy, relates to the cultural field and aims at development and promotion of sustainable design through participatory approaches connecting art, culture, science and technology.

The **EU Action plan on the Sendai Framework** encourages - as one of its implementation priorities - the integration of cultural heritage in national disaster risk reduction strategies of the EU Member States.

The **New European Agenda for Culture** (2018) included, as one of 10 initiatives of the 2018 European Year of Cultural Heritage, an activity aimed at fostering European cooperation in the field of risk management for cultural heritage. In particular, a EC Study on "Safeguarding Cultural Heritage from Natural and Man-Made Disasters" was released within the framework of this initiative.

"Sustainability in cultural heritage" is one of the priorities of the **Work Plan for Culture 2019-2022** that includes an action on identification and exchange of good practices for historic areas in relation to adaptation of climate change in line with the Paris agreement and the UN SDG 13 on climate action, with a specific focus to energy efficiency of the historic buildings.[5]

The **report on the Work Plan for Culture 2019-2022** highlights that the topic of Adaptation of cultural heritage to climate change "despite the urgency, this topic is still in its infancy" and recognises an important value of the report prepared by OMC group on "Strengthening Cultural Heritage Resilience for Climate Change".[6]

The **new Work Plan for Culture for the 2023-2026 period** is under development and will be adopted by the end of the year.

The **EU Council conclusions on risk management in the area of cultural heritage 2020/C 186/01** recognized the urgency "to undertake measures to prevent, mitigate, adapt to and, where possible, reverse negative impacts" of climate change on cultural and natural heritage.

Regarding the EU legal and policy framework particularly important for the field of risk management for cultural heritage, the most relevant documents at the EU level are listed in Table 4.

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[5] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52018XG1221(01)

[6] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0317&qid=16566622 90105

Table 4 - Most relevant legal and policy framework documents at EU level

| Legal / Policy references | Category of Cultural Heritage | Type of risks |
|---|---|---|
| Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (Text with EEA relevance) | Not specified | Flood risk |
| Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe | Not specified | Air pollution |
| Regulation (EU) 2021/836 of the European Parliament and of the Council of 20 May 2021 amending Decision No 1313/2013/EU on a Union Civil Protection Mechanism (Text with EEA relevance) | Tangible cultural heritage | Natural and man-made disaster risks, climate change related risks |
| (2019/C 428/07) Commission Notice Reporting Guidelines on Disaster Risk Management | Tangible cultural heritage, including archaeological sites, monuments, and parks | Natural and man-made disaster risks, climate change related risks |

## Italy

The main legal act on protection of cultural heritage in Italy is the Code of Cultural Heritage and Landscape (Digs 42/2004). The Code regards different categories of cultural heritage (architectural, historical and artistic, archaeological, archival, library heritage), including cultural landscapes. The territorial planning regulations also play an important role in cultural heritage preservation, formulating the rules for restoration and conservation interventions.

Table 5 contains the non-exhaustive list of the relevant legal references in the field of risk management for cultural heritage. In particular, Italy adopted regulations relevant for management of anthropic, floods, geological and seismic risks, and air pollution.

Cultural heritage is cited in the Italian National sustainability strategy, National climate adaptation plan and National recovery and resilience plan (EC, 2022).

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Table 5 - Relevant legal references in the field of risk management for cultural heritage in Italy

| Legal references | Category of CH | Type of risks |
|---|---|---|
| D.L. 155/2010 - Attuazione della direttiva 2008/50/CE relativa alla qualità dell'aria ambiente e per un'aria più pulita in Europa | | Air pollution |
| Circolare SG n. 45, 3 dicembre 2015 – Misure Straordinarie per il rischio Terrorismo | | Anthropic risk |
| Circolare SG n. 1, 13 gennaio 2015 – Sicurezza del Patrimonio Culturale – Misure preventive | | Anthropic risk |
| Circolare SG n. 155, 23 luglio 2008 – Misure urgenti per la sicurezza del patrimonio culturale dal rischio di atti vandalici | | Anthropic risk |
| Circolare DG-SPC n. 1, 5 agosto 2020 – Decreto 10/07/2020 – Norme tecniche di prevenzione incendi per gli edifici sottoposti a tutela ai sensi del decreto legislativo 22 gennaio 2004, n. 42, aperti al pubblico, destinati a contenere musei, gallerie, esposizioni, mostre, biblioteche e archivi, ai sensi dell'art. 15 del decreto legislativo 8 marzo 2006, n. 139 | | Fire risk |
| DPR n. 418, 30 giugno 1995 – Regolamento concernente norme di sicurezza antincendio per gli edifici di interesse storico-artistico destinati a biblioteche ed archivi | | Fire risk |
| DM n. 569, 20 maggio 1992 – Regolamento contenente norme di sicurezza antincendio per gli edifici storici e artistici destinati a musei, gallerie, esposizioni e mostre | | Fire risk |
| D.Lgs. 23 febbraio 2010, n. 49, "Attuazione della Direttiva 2007/60/CE relativa alla valutazione e alla gestione dei rischi di alluvioni" | | Flood risk |
| Direttiva del 23 Aprile 2015 - Aggiornamento della direttiva 12 dicembre 2013, relativa alle «Procedure per la gestione delle attivita' di messa in sicurezza e salvaguardia del patrimonio culturale in caso di emergenze derivanti da calamità naturali». | | Geological risks |
| Piano Straordinario Nazionale di Monitoraggio e Conservazione dei Beni Culturali Immobili (ai sensi del D.Lgs. settembre 2018, n. 109) | Monuments and sites | Seismic risk |
| Circolare SG n. 15, 30 aprile 2015 – Disposizione in materia di tutela del patrimonio architettonico e mitigazione del rischio sismico | Monuments and sites | Seismic risk |
| Direttiva PdCM 9 febbraio 2011 – Valutazione e riduzione del rischio sismico del patrimonio culturale con riferimento alle Norme tecniche per le costruzioni di cui al DM 14/01/2008 | Monuments and sites | Seismic risk |
| Circolare SG n. 26, 2 dicembre 2010 – Linee guida per la valutazione e riduzione del rischio sismico del patrimonio culturale allineate alle nuove norme tecniche per costruzioni (DM 14 gennaio 2008) | | Seismic risk |
| Circolare SG n. 14, 17 marzo 2022 – Linee guida individuazione adeguamento progettazione allestimento depositi per ricovero temporaneo beni culturali mobili annessi laboratori di restauro | | |
| Circolare congiunta DG-SPC/APAB n . 7, n. 47 – Gestione coordinata delle attività di messa in sicurezza e salvaguardia del patrimonio culturale in occasione di eventi derivanti da calamità naturali. Precisazioni in merito alle procedure | | |

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| Circolare SG n. 22, 26 marzo 2020 – Gestione coordinata delle attività di messa in sicurezza e salvaguardia del patrimonio culturale in occasione di eventi derivanti da calamità naturali. Specificazioni | | |
| Direttiva DG-APAB 12 agosto 2016 – Procedure di rimozione e recupero delle macerie di beni tutelati e di edilizia storica | Monuments and sites | |
| D.L. 10 maggio 2001 - Atto di indirizzo sui criteri tecnico-scientifici e sugli standard di funzionamento e sviluppo dei musei | Museums | |
| Circolare n. 30 del 6/2/2007- Piani di emergenza per la tutela del patrimonio culturale- pianificazione e gestione delle esercitazioni | | |
| D.M. 21 Febbraio 2018 - Adozione dei livelli minimi uniformi di qualità per i musei e i luoghi della cultura di appartenenza pubblica e attivazione del sistema museale nazionale | Museums | |
| Circolare n.10 del 1 Aprile 2015 - Protocollo attuativo fra il Ministero dei beni e delle attività culturali e del turismo e la Conferenza Episcopale Italiana finalizzato alla gestione coordinata dell'emergenza. Indicazioni operative | | |

## Czech Republic

Cultural heritage is cited in the Czech Republic National sustainability strategy, National climate adaptation plan and National recovery and resilience plan (EC, 2022).

The current legislative and policy framework relevant for the risk management for cultural heritage, in particular in climate change scenarios, is listed in Table 6.

Management of the flood risks is especially important for the Czech Republic. During the last two decades, the Czech Republic has been repeatedly struck by severe floods that caused immense damages to the health of people and property. Considering this, the country has developed a rather detailed legislative and policy framework in this field. One of the cited documents, the National Concept of dealing with flood protection in the Czech Republic with use of technical and environmentally-friendly measures adopted in 2010, has as a primary objective the assessment and management of flood risks in accordance with the sustainable development agenda and the EU Directives such as the Directive 2007/60/EC (Floods Directive)  and the objectives of Directive 2000/60/EC (Water Framework Directive). There are also the Flood Emergency Plan developed for Prague city and the International Flood Risk Management Plan for Elbe River Basin. The Flood Emergency Plan for Prague integrates the protection of listed cultural heritage.

There are also several methodologies regarding the risk management for cultural heritage developed in the Czech Republic:

- Methodology and database of fire protection of historic buildings;

- Methodology of preservation of objects of a cultural nature - optimization of conditions with the aim of achieving long-term sustainability;
- Methodology and tools of protection and preservation of cultural heritage at risk from flooding.

In addition, there are standards declaring cultural monuments, national cultural monuments and heritage zones. These are in particular decrees of the Ministry of Culture on the declaration of the territory of selected parts of landscape units as heritage zones or a government decree declaring certain cultural monuments as national cultural monuments:

- **Decree of the Ministry of Culture of the Czech Republic No. 187/2007** Coll., which establishes the content and requirements of the territory plan with archaeological finds, as amended.
- **Decree of the Ministry of Culture of the Czech Republic No. 420/2008** Coll., which establishes the requirements and content of the plan for the protection of heritage reserves and heritage zones, as amended

Further regional decrees, e.g.:

- **Government Regulation No. 66/1971** Coll. on heritage preservation in the capital city of Prague.
- **Decree of the Capital City of Prague** of 28 September 1993 No. 10/1993 Coll. HMP on the declaration of parts of the territory of the capital city of Prague as heritage zones and on the determination of the conditions for their protection.

Table 6 - Relevant legal references in the field of risk management for cultural heritage in Czech Republic

| Legal references | Type of CH | Type of risks |
|---|---|---|
| Koncepce řešení problematiky ochrany před povodněmi v ČR s využitím technických a přírodě blízkých opatření [Concept of dealing with flood protection in the Czech Republic with use of technical and environmentally-friendly measures] (2010) (National level document) | Other | Flood risk |
| Povodňový plán ČR [Flood Emergency Plan CR] (Prague city level) | Other | Flood risk |
| International Flood Risk Management Plan *(Elbe River Basin)* | Other | Flood risk |
| Metodika a nástroje ochrany a záchrany kulturního dědictví ohroženého povodněmi [Methodology and tools of protection and preservation of cultural heritage at risk from flooding], 2011/2015 | Other | Flood risk |
| Zákon o státní památkové péči s judikaturou a výkladovými stanovisky [Act on state monument care with jurisprudence and interpretative opinions] | Monuments and sites | Other |

| Zákon o státní památkové péči - účinný od 1. 7. 2023 [Act on state monument care - effective from 1 July 2023] | Monuments and sites | Other |
|---|---|---|
| Zákon č. 101/2001 Sb, o navracení nezákonně vyvezených kulturních statků, v platném znění [Act No. 101/2001 Coll., on the return of illegally exported cultural goods, as amended] | Other | Other |
| Zákon č. 71/1994 Sb., o prodeji a vývozu předmětů kulturní hodnoty [Act No. 71/1994 Coll., on the sale and export of objects of cultural value] | Other | Other |
| Vyhláška č. 66/1988 Sb., kterou se provádí zákon České národní rady č. 20/1987 Sb., o státní památkové péči [Decree No. 66/1988 Coll., implementing Act of the Czech National Council No. 20/1987 Coll., on State Monument Care] | Monuments and sites | Other |
| Zákon č. 122/2000 Sb., o ochraně sbírek muzejní povahy a o změně některých dalších zákonů [Act No. 122/2000 Coll., on the protection of museum collections and on the amendment of certain other laws] | Monuments and sites | Other |

## Germany

The German sustainable development strategy highlights the commitment of the German government to preserve cultural heritage, in particular through the UNESCO programmes, the Cultural Preservation Programme of the Federal Foreign Office, the Coordination Office for World Heritage.[7]

There are several regulations at national level (Table 7) concerning anthropic, fire and seismic risks, even though there is no comprehensive framework regarding the risk management in the cultural heritage field. The Cultural Property Protection Act sets out the rules regarding the export of cultural property from Germany.

Cultural heritage is cited in the German National sustainability strategy, but it is not integrated in the National climate adaptation plan and National recovery and resilience plan (EC, 2022).

With regard to climate change related risks, the German Strategy for Adaptation to Climate change and the Climate Action plan 2030 do not mention cultural heritage.[8]

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[7]
https://www.bundesregierung.de/resource/blob/974430/1940716/1c63c8739d10011eb116fda1aecb61ca/german-sustainable-development-strategy-en-data.pdf?download=1

[8]
https://www.bmuv.de/fileadmin/bmu-import/files/english/pdf/application/pdf/das_gesamt_en_bf.pdf
https://ec.europa.eu/clima/sites/lts/lts_de_en.pdf

Table 7 - Relevant legal references in the field of risk management for cultural heritage in Germany

| Legal references | Type of CH | Type of risks |
|---|---|---|
| Act on the Protection of Cultural Property | Monuments and sites/ Movable cultural heritage | Anthropic risk |
| Climate Action Plan 2050 – Germany's long-term low greenhouse gas emission development strategy | | Climate change |
| DIN VDE 0833-1:2014-10 – Gefahrenmeldeanlagen für Brand, Einbruch und Überfall – Teil 1: Allgemeine Festlegungen 2014 | | Fire risk |
| DIN VDE 0833-2:2017-10 – Gefahrenmeldeanlagen für Brand, Einbruch und Überfall – Teil 2: Festlegungen für Brandmeldeanlagen | | Fire risk |
| DIN VDE 0833-3:2020-10 – Gefahrenmeldeanlagen für Brand, Einbruch und Überfall – Teil 3: Festlegungen für Einbruch- und Überfallmeldeanlagen | | Fire risk |
| DIN 4102 2016 Fire behaviour of building materials and building components | | Fire risk |
| DIN EN 13501 2010 Fire classification of construction products and building elements | | Fire risk |
| DIN 4149: Bauten in deutschen Erdbebengebieten - Lastannahmen, Bemessung und Ausführung üblicher Hochbauten | | Seismic risk |

## Austria

The owners of cultural heritage assets themselves are responsible for the protection of cultural heritage in Austria. At the same time, they do not have any liability to inform the authorities on existing plans. No national guideline for the development and implementation of such plans exists.

Thus, at the moment, there is no general plan for the protection of cultural heritage in Austria, neither on regional or local level.

For the ten UNESCO World Heritage sites in Austria management plans do exist, which alas do not necessarily take issues of cultural heritage protection into account. Therefore aside from natural hazards organisational shortcomings such as the lack of a general plan for the protection of cultural heritage, neither on regional nor local level, as is the case in Austria are identified as an issue.

Cultural heritage is cited in the Austrian National sustainability strategy, National climate adaptation plan and National recovery and resilience plan (EC, 2022).

# 4. Mapping cultural heritage at risk in targeted countries: results from partners' survey

## Mapping cultural heritage at risk: introduction and scope

The mapping of the cultural heritage at risk is aimed at supporting the assessment activity of the pending risks on tangible cultural heritage relating to climate change and anthropic activities.

Heritage at risk maps, illustrated in this section, are the cartographic result of the lists provided by the partners on the endangered or vulnerable cultural heritage due to the effects of climate change and the impacts of natural hazards and anthropic action.

Each partner provided a list of cultural heritage endangered by climate change effects, natural and anthropic hazards impacts, based on a predefined scheme aimed at reporting and highlighting the following information: (1) Country; (2) Site; (3) Cultural Heritage type; (4) Risk type.

These four variables aim to locate and differentiate the types of tangible cultural heritage at risk by crossing them with the main pending risks. The goal is to address targeted protection measures and actions based on the specific characteristics of cultural heritage and related risks in the national and regulatory context of reference.

Mapping of heritage at risk is also enriched by further complementary sources of international relevance such as UNESCO, International Council on Monuments and Sites (ICOMOS) and World Monument Fund.

## Additional sources' list description

### UNESCO World Heritage List

The World Heritage List (WHL) is drawn up by UNESCO to protect and enhance sites and cultural assets of outstanding universal value. This expression indicates a strategic vision aimed at recognizing and protecting the authenticity and integrity of cultural sites that attest to human interactions, cultural coexistence and spirituality and creative expression. This strategic vision implies a broad concept of cultural heritage that also includes cultural landscapes, sites of natural interest and historic urban centres.

Inclusion within the WHL is the result of complex procedures bound to certain selection criteria (Table 8). The inclusion also implies particular protections of the site within the jurisdiction and national regulations of reference in the field of

urban and territorial planning and the management of vulnerability and exposure to environmental and anthropogenic risk factors.

The existence of only one of these criteria implies inclusion in the list. However, the inclusion is not irreversible but subject to periodic reviews to confirm that the selection criteria are met. For this reason, the management of a World Heritage Site is a matter included in urban and territorial planning and management and covers a particular area in political and administrative decisions at national and local level.

The 4 targeted countries host 123 sites (**World Heritage Sites - WHS**) included in the **UNESCO World Heritage List**, divided by (fig. 4):

- Italy: 51 sites (48 cultural, 3 natural)
- Germany: 41 sites (40 cultural, 1 natural)
- Czechia: 13 sites
- Austria: 7 sites
- Transboundary: 11 sites



Figure 4 - Sites in UNESCO-World Heritage Sites sort by targeted countries

Table 8 - List of UNESCO-WHL inclusion criteria[9]

| N. | Selection criteria description |
|---|---|
| (i) | to represent a masterpiece of human creative genius |
| (ii) | to exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design |
| (iii) | to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared |
| (iv) | to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history |
| (v) | to be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change |
| (vi) | to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria) |
| (vii) | to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance |
| (viii) | to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features |
| (ix) | to be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals |
| (x) | to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation |

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[9] Source: https://whc.unesco.org/en/list/

Table 9 - List of UNESCO-WHL in targeted countries[10]

| Site name | Date inscribed | Criteria |
|---|---|---|
| Austria | | |
| Historic Centre of the City of Salzburg | 1996 | (ii) (iv) (vi) |
| Semmering Railway | 1998 | (ii) (iv) |
| Palace and Gardens of Schönbrunn | 1996 | (i) (iv) |
| Hallstatt-Dachstein / Salzkammergut Cultural Landscape | 1997 | (iii) (iv) |
| Wachau Cultural Landscape | 2000 | (ii) (iv) |
| Historic Centre of Wien | 2001 | (ii) (iv) (vi) |
| City of Graz – Historic Centre and Schloss Eggenberg | 1999 | (ii) (iv) |
| Austria,Belgium,Czechia,France,Germany,Italy,United Kingdom of Great Britain and Northern Ireland | | |
| The Great Spa Towns of Europe | 2021 | (ii) (iii) |
| Austria,France,Germany,Italy,Slovenia, Switzerland | | |
| Prehistoric Pile Dwellings around the Alps | 2011 | (iv) (v) |
| Austria,Germany,Slovakia | | |
| Frontiers of the Roman Empire – The Danube Limes (Western Segment) | 2021 | (ii) (iii) (iv) |
| Austria, Hungary | | |
| Fertö / Neusiedlersee Cultural Landscape | 2001 | (v) |
| Czechia | | |
| Historic Centre of Český Krumlov | 1992 | (iv) |
| Historic Centre of Telč | 1992 | (i) (iv) |
| Pilgrimage Church of St John of Nepomuk at Zelená Hora | 1994 | (iv) |
| Kutná Hora: Historical Town Centre with the Church of St Barbara and the Cathedral of Our Lady at Sedlec | 1995 | (ii) (iv) |
| Lednice-Valtice Cultural Landscape | 1996 | (i) (ii) (iv) |
| Holy Trinity Column in Olomouc | 2000 | (i) (iv) |
| Gardens and Castle at Kroměříž | 1998 | (ii) (iv) |
| Holašovice Historic Village | 1998 | (ii) (iv) |
| Litomyšl Castle | 1999 | (ii) (iv) |

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[10] Source: https://whc.unesco.org/en/list/

| | | |
|---|---|---|
| Tugendhat Villa in Brno | 2001 | (ii) (iv) |
| Historic Centre of Prague | 1992 | (ii) (iv) (vi) |
| Jewish Quarter and St Procopius' Basilica in Třebíč | 2003 | (ii) (iii) |
| Landscape for Breeding and Training of Ceremonial Carriage Horses at Kladruby nad Labem | 2019 | (iv) (v) |
| Czechia, Germany | | |
| Erzgebirge/Krušnohoří Mining Region | 2019 | (ii) (iii) (iv) |
| Germany | | |
| Speyer Cathedral | 1981 | (ii) |
| Castles of Augustusburg and Falkenlust at Brühl | 1984 | (ii) (iv) |
| Roman Monuments, Cathedral of St Peter and Church of Our Lady in Trier | 1986 | (i) (iii) (iv) (vi) |
| Palaces and Parks of Potsdam and Berlin | 1990 | (i) (ii) (iv) |
| Collegiate Church, Castle and Old Town of Quedlinburg | 1994 | (iv) |
| Town of Bamberg | 1993 | (ii) )(iv) |
| Völklingen Ironworks | 1994 | (ii) (iv) |
| Luther Memorials in Eisleben and Wittenberg | 1996 | (iv) (vi) |
| Classical Weimar | 1998 | (iii) (vi) |
| Museumsinsel (Museum Island), Berlin | 1999 | (ii) (iv) |
| Wartburg Castle | 1999 | (iii) (vi) |
| Monastic Island of Reichenau | 2000 | (iii) (iv) (vi) |
| Zollverein Coal Mine Industrial Complex in Essen | 2001 | (ii) (iii) |
| Upper Middle Rhine Valley | 2002 | (ii) (iv) (v) |
| Historic Centres of Stralsund and Wismar | 2002 | (ii) (iv) |
| Town Hall and Roland on the Marketplace of Bremen | 2004 | (iii) (iv) (vi) |
| Old town of Regensburg with Stadtamhof | 2006 | (ii) (iii) (iv) |
| Berlin Modernism Housing Estates | 2008 | (ii) (iv) |
| Mines of Rammelsberg, Historic Town of Goslar and Upper Harz Water Management System | 1992 | (i) (ii) (iii) (iv) |
| St Mary's Cathedral and St Michael's Church at Hildesheim | 1985 | (i) (ii) (iii) |
| Cologne Cathedral | 1996 | (i) (ii) (iv) |

| | | |
|---|---|---|
| Hanseatic City of Lübeck | 1987 | (iv) |
| Messel Pit Fossil Site | 1995 | (viii) |
| Würzburg Residence with the Court Gardens and Residence Square | 1981 | (i) (iv) |
| Fagus Factory in Alfeld | 2011 | (ii) (iv) |
| Margravial Opera House Bayreuth | 2012 | (i)(iv) |
| Pilgrimage Church of Wies | 1983 | (i)(iii) |
| Abbey and Altenmünster of Lorsch | 1991 | (iii)(iv) |
| Bergpark Wilhelmshöhe | 2013 | (iii)(iv) |
| Aachen Cathedral | 1978 | (i)(ii)(iv)(vi) |
| Carolingian Westwork and Civitas Corvey | 2014 | (ii)(iii)(iv) |
| Speicherstadt and Kontorhaus District with Chilehaus | 2015 | (iv) |
| Caves and Ice Age Art in the Swabian Jura | 2017 | (iii) |
| Bauhaus and its Sites in Weimar, Dessau and Bernau | 1996 | (ii)(iv)(vi) |
| Archaeological Border complex of Hedeby and the Danevirke | 2018 | (iii)(iv) |
| Water Management System of Augsburg | 2019 | (ii)(iv) |
| Naumburg Cathedral | 2018 | (i)(ii) |
| Mathildenhöhe Darmstadt | 2021 | (ii)(iv) |
| Garden Kingdom of Dessau-Wörlitz | 2000 | (ii)(iv) |
| Maulbronn Monastery Complex | 1993 | (ii)(iv) |
| ShUM Sites of Speyer, Worms and Mainz | 2021 | (ii)(iii)(vi) |
| Germany, Netherlands | | |
| Frontiers of the Roman Empire – The Lower German Limes | 2021 | (ii)(iii)(iv) |
| Germany, Poland | | |
| Muskauer Park / Park Mużakowski | 2004 | (i)(iv) |
| Germany, United Kingdom of Great Britain and Northern Ireland | | |
| Frontiers of the Roman Empire | 1987 | (ii)(iii)(iv) |
| Holy See, Italy | | |
| Historic Centre of Rome, the Properties of the Holy See in that City Enjoying Extraterritorial Rights and San Paolo Fuori le Mura | 1980 | (i)(ii)(iii)(iv)(vi) |
| Italy | | |

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| Church and Dominican Convent of Santa Maria delle Grazie with "The Last Supper" by Leonardo da Vinci | 1980 | (i)(ii) |
| Rock Drawings in Valcamonica | 1979 | (iii)(vi) |
| Venice and its Lagoon | 1987 | (i)(ii)(iii)(iv)(v)(vi) |
| Castel del Monte | 1996 | (i)(ii)(iii) |
| 18th-Century Royal Palace at Caserta with the Park, the Aqueduct of Vanvitelli, and the San Leucio Complex | 1997 | (i)(ii)(iii)(iv) |
| Historic Centre of San Gimignano | 1990 | (i)(iii)(iv) |
| The Sassi and the Park of the Rupestrian Churches of Matera | 1993 | (iii)(iv)(v) |
| City of Vicenza and the Palladian Villas of the Veneto | 1994 | (i)(ii) |
| Historic Centre of Siena | 1995 | (i)(ii)(iv) |
| Crespi d'Adda | 1995 | (iv)(v) |
| Ferrara, City of the Renaissance, and its Po Delta | 1995 | (ii)(iii)(iv)(v)(vi) |
| The "Trulli" of Alberobello | 1996 | (iii)(iv)(v) |
| Early Christian Monuments of Ravenna | 1996 | (i)(ii)(iii)(iv) |
| Historic Centre of the City of Pienza | 1996 | (i)(ii)(iv) |
| City of Verona | 2000 | (ii)(iv) |
| Botanical Garden (Orto Botanico), Padua | 1997 | (ii)(iii) |
| Cathedral, Torre Civica and Piazza Grande, Modena | 1997 | (i)(ii)(iii)(iv) |
| Historic Centre of Urbino | 1998 | (ii)(iv) |
| Archaeological Areas of Pompei, Herculaneum and Torre Annunziata | 1997 | (iii)(iv)(v) |
| Costiera Amalfitana | 1997 | (ii)(iv)(v) |
| Archaeological Area of Agrigento | 1997 | (i)(ii)(iii)(iv) |
| Villa Romana del Casale | 1997 | (i)(ii)(iii) |
| Su Nuraxi di Barumini | 1997 | (i)(iii)(iv) |
| Cilento and Vallo di Diano National Park with the Archeological Sites of Paestum and Velia, and the Certosa di Padula | 1998 | (iii)(iv) |
| Villa Adriana (Tivoli) | 1999 | (i)(ii)(iii) |
| Isole Eolie (Aeolian Islands) | 2000 | (viii) |
| Assisi, the Basilica of San Francesco and Other Franciscan Sites | 2000 | (i)(ii)(iii)(iv)(vi) |
| Late Baroque Towns of the Val di Noto (South-Eastern Sicily) | 2002 | (i)(ii)(iv)(v) |

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| | | |
|---|---|---|
| Villa d'Este, Tivoli | 2001 | (i)(ii)(iii)(iv)(vi) |
| Val d'Orcia | 2004 | (iv)(vi) |
| "Sacri Monti" of Piedmont and Lombardy | 2003 | (ii)(iv) |
| Etruscan Necropolises of Cerveteri and Tarquinia | 2004 | (i)(iii)(iv) |
| Syracuse and the Rocky Necropolis of Pantalica | 2005 | (ii)(iii)(iv)(vi) |
| Genoa: "Le Strade Nuove" and the system of the "Palazzi dei Rolli" | 2006 | (ii)(iv) |
| Mantua and Sabbioneta | 2008 | (ii)(iii) |
| Piazza del Duomo, Pisa | 1987 | (i)(ii)(iv)(vi) |
| The Dolomites | 2009 | (vii)(viii) |
| Residences of the Royal House of Savoy | 1997 | (i)(ii)(iv)(v) |
| Longobards in Italy. Places of the Power (568-774 A.D.) | 2011 | (ii)(iii)(vi) |
| Historic Centre of Naples | 1995 | (ii)(iv) |
| Medici Villas and Gardens in Tuscany | 2013 | (ii)(iv)(vi) |
| Mount Etna | 2013 | (viii) |
| Vineyard Landscape of Piedmont: Langhe-Roero and Monferrato | 2014 | (iii)(v) |
| Arab-Norman Palermo and the Cathedral Churches of Cefalú and Monreale | 2015 | (ii)(iv) |
| Archaeological Area and the Patriarchal Basilica of Aquileia | 1998 | (iii)(iv)(vi) |
| Le Colline del Prosecco di Conegliano e Valdobbiadene | 2019 | (v) |
| Padua's fourteenth-century fresco cycles | 2021 | (ii) |
| The Porticoes of Bologna | 2021 | (iv) |
| Historic Centre of Florence | 1982 | (i)(ii)(iii)(iv)(vi) |
| Ivrea, industrial city of the 20th century | 2018 | (iv) |
| Portovenere, Cinque Terre, and the Islands (Palmaria, Tino and Tinetto) | 1997 | (ii)(iv)(v) |
| Italy, Switzerland | | |
| Rhaetian Railway in the Albula / Bernina Landscapes | 2008 | (ii)(iv) |
| Monte San Giorgio | 2003 | (viii) |

## ICOMOS World Reports on Monuments and Sites in Danger

ICOMOS is an worldwide non-governmental organisation composed of a network of experts from various disciplines relating to the conservation and protection of cultural heritage sites. Its mission consists in the promotion, management and enhancement of cultural heritage by integrating its historical dimension with social and cultural functionalities.

As an internationally recognized institution, ICOMOS periodically publishes reports on Heritage at Risk in order to raise public awareness and awareness of the pending risks on cultural heritage, the causes of decay and abandonment.

The consultation of the ICOMOS reports was fundamental to enrich the picture of the sites at risk in the targeted countries, in terms of location and types of risk.

## World Monuments Fund

Finally, the mapping is enriched by the sites under protection by the World Monument Fund (WMF) organisation, a cultural heritage protection and maintenance programme involving local citizens and associations to preserve the social and cultural value of heritage from neglect and the effects of climate change.

WMF is an independent organisation devoted to safeguarding the world's treasured places to enrich people's lives and build mutual understanding across cultures and communities. Within its activity, WMF has launched the Watch tool for raising awareness about heritage places in need for protection and galvanising action and support for their preservation.

Watch programme encompasses a broad range of examples of how global challenges interest in tangible cultural heritage. Among global challenges there are climate change (global warming and its impact on heritage places) and crisis recovery due to armed conflicts and other types of destruction (anthropic risks) and natural disasters (flood, fire, seismic risks).

Watch programme involves 880 projects on cultural heritage protection spread around the world. Relating to the targeted countries:

- Italy 76
- Czech Republic 20
- Germany 14
- Austria 6

## Methodology for mapping cultural heritage at risk in targeted country

Partners provide a list of cultural heritage in danger in their specific targeted country. In order to build an overall mapping of cultural heritage and risks that affected it, surveys highlighted these specific.

The structure of the assessment survey for the list of cultural sites at risk reflects a simple and schematic structure aimed at identifying and locating the types of cultural heritage and the related risks.

Categorization of cultural heritage reflects specific characteristics of places and sites under threat in terms of morphology (areas, points, linear feature), functionality and structural aspects. These aspects require targeted and detailed management.

Cultural Heritage typologies are classified according to the following criteria:

- **Museums**, as places for a large and organic collection of works of art and objects of historical, cultural, artistic, scientific and ethno-anthropological interest.
- **Libraries** and **archives**, as places of extensive and organic collection and archiving of texts, books and archival documents of historical, cultural, scientific and ethno-anthropological and artistic interest.
- **Monuments** and **sites**, as individual architectural and specific assets of historical, cultural, scientific and ethno-anthropological, artistic and monumental interest.
- **Archeological sites**, as sites and places that testify to the presence of ancient civilizations in terms of monuments, buildings and urban and infrastructural traces.
- **Cultural landscapes**, as places that attest to particular interactions between society and the natural environment over the course of history and that connote the peculiar visible aspects of the territory.
- **Historic urban centres**, as cities that have unique and aesthetic historical-cultural and artistic characteristics due to the presence of monumental buildings, the appearance of buildings and urban structures dating back to past eras.
- **Others**, that is, all those sites and places that do not fall into the aforementioned categories.

Risk types are classified according to the following criteria:

- **Air Pollution** - air pollution caused by traffic, industry and human activities generally impacts on the quality and maintenance of tangible cultural heritage.
- **Biological threats** - pathogenic and biological agents threaten the integrity of tangible cultural heritage, due to neglect, poor maintenance, neglect of the site or because the site/asset is in an unsuitable environment
- **Climate change** - the effects of climate change impact tangible cultural heritage. The concept of climate change is broad and affects, in various measures, all the "risk types" listed here. The choice falls on climate change when the risk is not specified by the sources or when more effects that alter the surrounding environment impact on the tangible cultural heritage.
- **Environmental risk** - exposure of cultural heritage to multiple and simultaneous natural disasters
- **Flood risk** - exposure of tangible cultural heritage to the effects of floods or their location in flood-prone areas. This category also includes goods displayed in coastal areas.
- **Fire risk** - cultural heritage exposed to fire or falling in areas covered by fire, affected by large fires or classified as a fire risk
- **Geological hazard** - exposure of cultural heritage to landslides or soil erosion
- **Seismic risk** - exposure of cultural heritage to seismic risk or falling in areas affected by historical seismic phenomena
- **Anthropic risk** - threats to cultural heritage arising from direct human action: armed conflicts, vandalism, deliberate damage and destruction (political choices or as a result of social revolts), urbanisation without rules, productive and economic activities. This category also includes inappropriate use, deliberate neglect due to a lack of knowledge and awareness of the place (such as incompatible features) of the site/ property and impacts related to mass tourism.
- **Other** - any other type of risk that does not fall into the previous categories. Usually generic risks such as water infiltration, humidity or restoration work and general maintenance.

## European Cultural Heritage under Threat: Mapping of sites at risks

### Targeted country: Italy

Pending risks on the cultural heritage framework in Italy appear varied (figs. 5-6-7). This characteristic is also linked to a high number of endangered cultural sites identified by the sources used in the mapping activity, spread throughout the national territory. The variety of landscapes and environments in the Italian context

expose the cultural heritage differently and peculiarly. The Italian case study reveals a complex framework also due to the combination of risk factors.

The most recurrent entry among the classified risks is "other". This means that the greatest threats to cultural heritage relate to factors related to time including: water infiltration, moisture, dust and residue layers, spontaneous vegetation. Aspects common also in other targeted countries, but that in Italy are more intertwined with anthropogenic risk factors linked to neglect, mismanagement and pollution resulting from strong urbanisation and human activities.

In the category of anthropogenic risks, there is more vandalism and the impacts of mass tourism. Factor particularly impacting within this category are the effects of uncontrolled urbanisation (as in the case of Padua), associated with causes related to urban traffic and vibration of rail transport (typical of the urban cultural heritage of Rome where there are particular critical points in the sites of the Arch of Trajan and in the Basilica Neopitagorica). There are also sporadic cases of neglect and devastation of cultural heritage dating back to World War II. The land privatisation is often an additional risk factor linked to the action and human activities. The land privatisation is mainly associated with poor maintenance and neglect due to inappropriate uses of cultural goods falling in private areas (as in the case of the Academy of Villa Adriana in Tivoli). Anthropogenic risk factors amplify the impacts of hydrogeological and flood risk. Peculiarities that, among the targeted countries, occur in Italy and the Czech Republic where the impacts of the 2003 flood were strong. In this case, the monumental bridges are particularly exposed, as in the case of Ponte Lucano and Ponte di Tivoli. The impacts related to hydrogeological risk are then more evident in those sites falling into the alluvial and coastal areas where uncontrolled urbanisation and industrial discharges amplify the risks. This is the case of the historic centre of Venice and its lagoon, where the effects of mass tourism also amplify the risks associated with coastal erosion and hydrogeological risk.

Particularly relevant is the exposure of cultural heritage to geological risk, as in the case of historic centres located in central Italy. These are historic centres excavated and built in the tuff where soil erosion is accentuated by human activities and exposure to atmospheric agents. The Italian cultural heritage is particularly threatened by exposure to seismic risk, as demonstrated by the recent earthquakes of L'Aquila (2009), Emilia Romagna (2012), Amatrice and Central Italy (2016-2017).
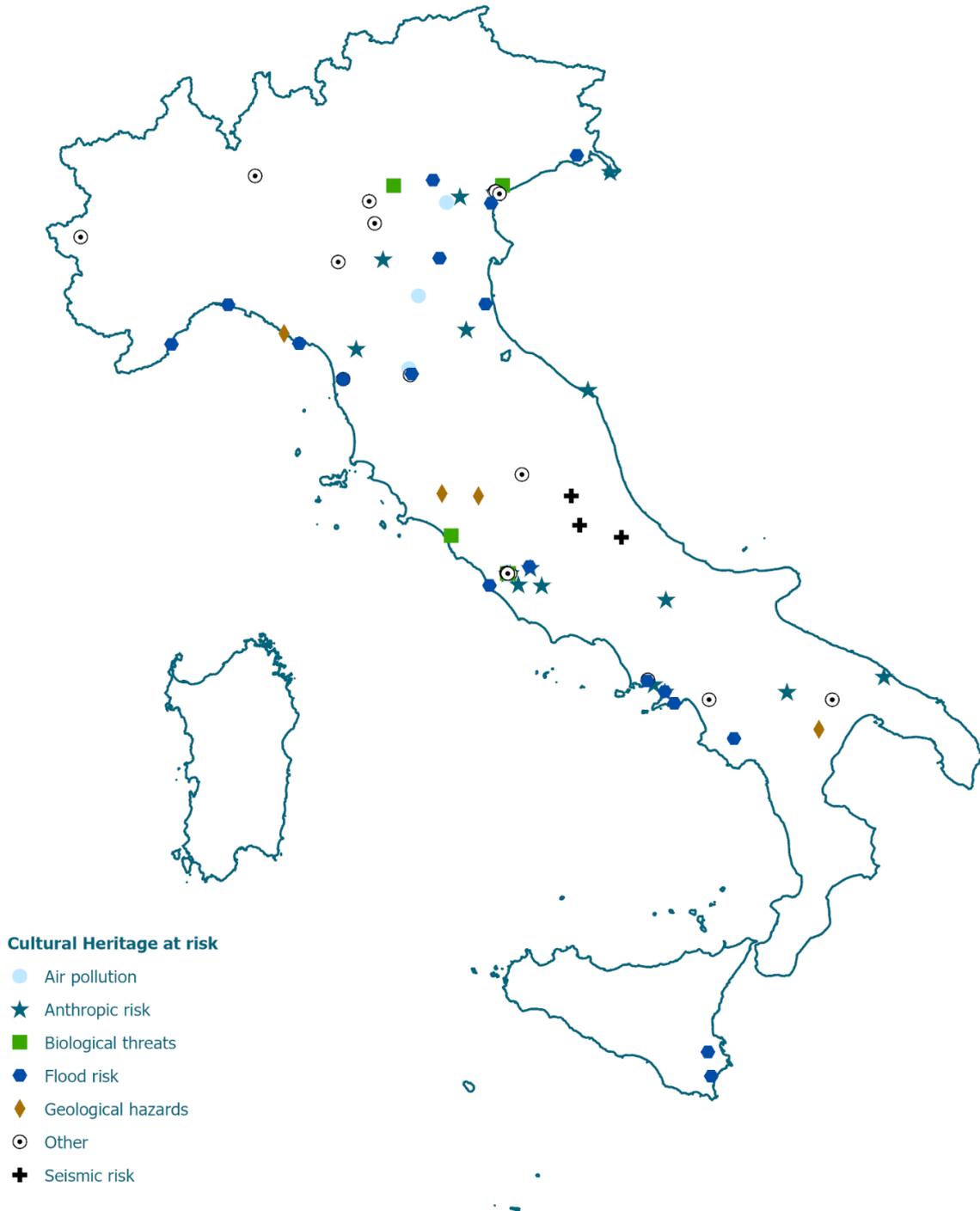
Figure 5 - Map of cultural heritage at risk in Italy

Figure 6  - Map of UNESCO sites in Italy
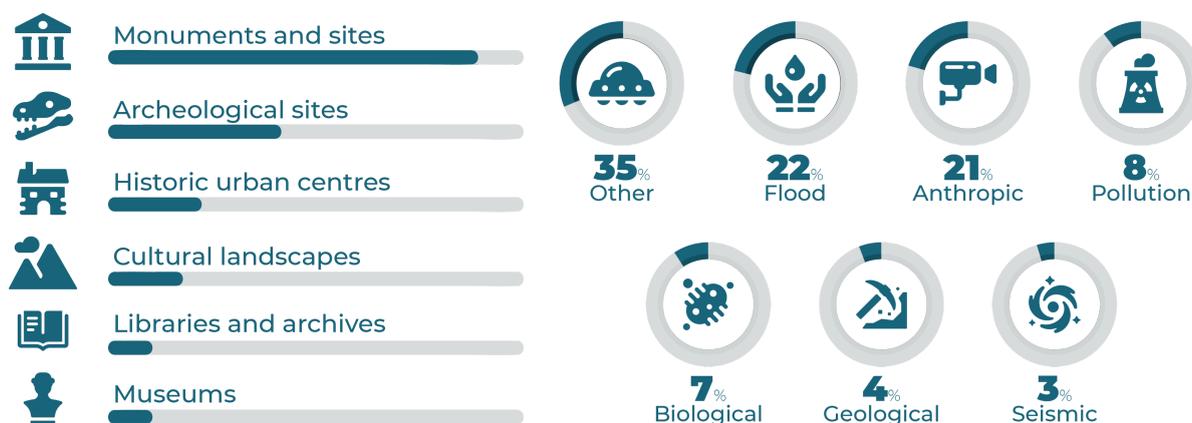
Figure 7 - Cultural heritage in Italy sort by typologies and risks

Table 10 - List of cultural heritage at risk in Italy from partners' survey response

| Site name | Location | Typology | Main risk |
|---|---|---|---|
| Etruscan Painted Tombs of Tarquinia | Tarquinia | Archeological sites | Biological threats |
| Ruins on the River Centa | Albenga | Archeological sites | Flood risk |
| Terra del Sole Prison Cells | Castrocaro Terme | Monuments and sites | Anthropic risk |
| Gardens of Villa Medici At Castello | Florence | Monuments and sites | Air pollution |
| Limonaia At Boboli Gardens and Garden of Villa Medici At Castello | Florence | Monuments and sites | Other |
| San Giacomo Maggiore Portico | Bologna | Monuments and sites | Air pollution |
| Murgia dei Trulli | Puglia Region | Archeological sites | Anthropic risk |
| Grottoes of San Michele | Salerno | Archeological sites | Other |
| Santi Ambrogio E Carlo Al Corso | Rome | Monuments and sites | Air pollution |
| Farnese Nymphaeum | Rome | Monuments and sites | Other |
| Botanical Garden of Padua University | Padua | Monuments and sites | Anthropic risk |
| Arch of Trajan | Rome | Archeological sites | Anthropic risk |
| Viscontian Bridge-Dam | Valeggio sul Mincio | Monuments and sites | Other |
| Transhumance Cultural Landscape | Molise Region | Cultural landscapes | Anthropic risk |
| Santi Quattro Coronati Cloister | Rome | Monuments and sites | Other |

| Santa Maria in Stelle Hypogeum | Verona | Archeological sites | Biological threats |
|---|---|---|---|
| Rupestrian Churches of Matera | Matera | Monuments and sites | Other |
| Portici Royal Palace | Portici | Monuments and sites | Anthropic risk |
| Port of Trajan Archaeological Park | Fiumicino | Archeological sites | Flood risk |
| Palazzo Doria Pamphilj | Valmontone | Monuments and sites | Anthropic risk |
| Neopitagorica Basilica | Rome | Archeological sites | Anthropic risk |
| Cimitero Acattolico | Rome | Monuments and sites | Air pollution |
| Chains Bridge | Bagni di Lucca | Monuments and sites | Anthropic risk |
| Academy of Hadrian's Villa | Tivoli | Archeological sites | Anthropic risk |
| Amatrice | Amatrice | Historic urban centres | Seismic risk |
| Civita Di Bagnoregio | Civita di Bagnoregio | Historic urban centres | Geological hazards |
| Fenestrelle Fortress | Turin | Monuments and sites | Other |
| Domus Aurea | Rome | Archeological sites | Biological threats |
| Villa of San Gilio | Oppido Lucano | Archeological sites | Anthropic risk |
| Ponte Lucano | Tivoli | Monuments and sites | Flood risk |
| Historic Center of Craco (Centro Storico Di Craco) | Craco | Historic urban centres | Geological hazards |
| Historic Center of L'Aquila | L'Aquila | Historic urban centres | Seismic risk |
| Muro dei Francesi | Ciampino | Monuments and sites | Anthropic risk |
| Arch of Janus | Rome | Archeological sites | Anthropic risk |
| World War II Concentration Camps in Italy (Fossoli) | Fossoli | Monuments and sites | Anthropic risk |
| World War II Concentration Camps in Italy (Risiera di San Sabba) | Risiera di San Sabba | Monuments and sites | Anthropic risk |
| Venice | Venice | Historic urban centres | Flood risk |
| Farnese Aviaries | Rome | Monuments and sites | Other |
| Temple of Hercules | Rome | Archeological sites | Other |
| Ancient Pompeii | Pompei | Archeological sites | Anthropic risk |
| Santa Maria Antiqua Church | Rome | Archeological sites | Other |
| Temple of Portunus | Rome | Archeological sites | Biological threats |

| | | | |
|---|---|---|---|
| Cinque Terre | Liguria Region | Cultural landscape | Geological hazards |
| Bartolomeo Colleoni Monument | Venice | Monuments and sites | Air pollution |
| Tuff Towns and Vie Cave | Lazio and Tuscany Regions | Historic urban centres | Geological hazards |
| Santa Croce in Gerusalemme Church | Rome | Monuments and sites | Other |
| Querini Stampalia Library | Venice | Libraries and archives | Other |
| The Venetian Ghetto | Venice | Monuments and sites | Flood risk |
| Royal Palace of Venice (Correr Museum) | Venice | Museums | Anthropic risk |
| Scuola Grande dei Carmini (Scuola Grande Di Santa Maria del Carmelo) | Venice | Monuments and sites | Anthropic risk |
| Basilica of Santa Maria Assunta | Venice | Monuments and sites | Biological threats |
| Pieve di San Gregorio | Perugia | Monuments and sites | Other |
| Camposanto | Pisa | Monuments and sites | Other |
| House of Augustus | Rome | Archeological sites | Biological threats |
| Ca' d'Oro | Venice | Monuments and sites | Anthropic risk |
| Biblioteca Marciana | Venice | Libraries and archives | Other |
| Santa Maria del Giglio Church (Santa Maria Zobenigo) | Venice | Monuments and sites | Other |
| Parma Cathedral | Parma | Monuments and sites | Other |
| Palazzo Ducale | Venice | Monuments and sites | Other |
| Real Albergo dei Poveri | Naples | Monuments and sites | Other |
| The Great Synagogue of Florence | Florence | Monuments and sites | Flood risk |
| San Giovanni in Bragora | Venice | Monuments and sites | Other |
| Santa Maria Della Visitazione (Church of the Pietà) | Venice | Monuments and sites | Other |
| Venice Synagogues Window Restoration | Venice | Monuments and sites | Other |
| Scuola Grande Di San Giovanni Evangelista | Venice | Monuments and sites | Other |
| Basilica of San Pietro Di Castello | Venice | Monuments and sites | Other |
| Abbey of San Clemente A Casauria | Pescara | Monuments and sites | Seismic risk |
| Norsa Synagogue | Mantua | Monuments and sites | Other |
| Scuola Grande di San Rocco | Venice | Monuments and sites | Other |

| Schola Canton | Venice | Monuments and sites | Other |
|---|---|---|---|
| Carracci Gallery At the Palazzo Farnese | Rome | Museums | Other |
| Villa dei Vescovi | Padua | Monuments and sites | Air pollution |
| Palazzo Contarini del Bovolo | Venice | Monuments and sites | Air pollution |
| Misericordia Laboratory | Venice | Monuments and sites | Other |
| Jewish Cemetery on the Lido | Venice | Monuments and sites | Other |
| Duomo, Theodelinda's Chapel | Monza | Monuments and sites | Other |
| Casina Farnese, Palatine Hill | Rome | Monuments and sites | Other |
| Venice and its Lagoon | Venice | Cultural landscape | Flood risk |
| Historic Centre of Naples | Naples | Historic urban centre | Flood risk |
| Archaeological Area and the Patriarchal Basilica of Aquileia | Aquileia | Archeological site | Flood risk |
| City of Vicenza and the Palladian Villas of the Veneto | Vicenza | Monuments and sites | Flood risk |
| Early Christian Monuments of Ravenna | Ravenna | Monuments and sites | Flood risk |
| Costiera Amalfitana | Campania Region | Cultural landscape | Flood risk |
| Late Baroque Towns of the Val di Noto (South-Eastern Sicily) | Val di Noto | Historical urban centre | Flood risk |
| Syracuse and the Rocky Necropolis of Pantalica | Syracuse | Archeological site | Flood risk |
| Genoa: Le Strade Nuove and the system of the Palazzi dei Rolli | Genoa | Monuments and sites | Flood risk |
| Piazza del Duomo, Pisa | Pisa | Monuments and sites | Flood risk |
| Archaeological Areas of Pompei, Herculaneum and Torre Annunziata | Campania Region | Archeological site | Flood risk |
| Ferrara, City of the Renaissance, and its Po Delta | Ferrara | Historic urban centre | Flood risk |
| Portovenere, Cinque Terre, and the Islands (Palmaria, Tino and Tinetto) | Liguria Region | Cultural landscape | Flood risk |
| Cilento and Vallo di Diano National Park with the Archeological Sites of Paestum and Velia, and the Certosa di Padula | Campania Region | Archeological site | Flood risk |

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**Targeted country: Czech Republic**

Among the main risks identified in the mapped sites of the Czech Republic are factors of carelessness, neglect and mismanagement (figs. 8-9-10). These factors fall into the category of anthropic risk, such as the effects of war conflicts of past eras or re-functionalization of cultural sites (palaces, castles) not compatible with proper maintenance and functionality of the site.

Excessive and uncontrolled urbanisation is the main threat of urban historic centres, especially in the capital Prague. Neglect is also the basis of the exposure of cultural heritage to biological threats and air pollution that cause the deterioration of heritage (ICOMOS, Heritage at risk 2016-2019).

The causes of anthropogenic risk then amplify the effects of hydrogeological and alluvial risk as in the 2003 floods that hit the country, threatening the integrity of buildings and monuments in urban centres and cultural landscapes.



**Cultural heritage at risk**
- Air pollution
- ★ Anthropic risk
- ■ Biological threats
- ▲ Climate change
- ⬟ Flood risk
- ⊙ Other
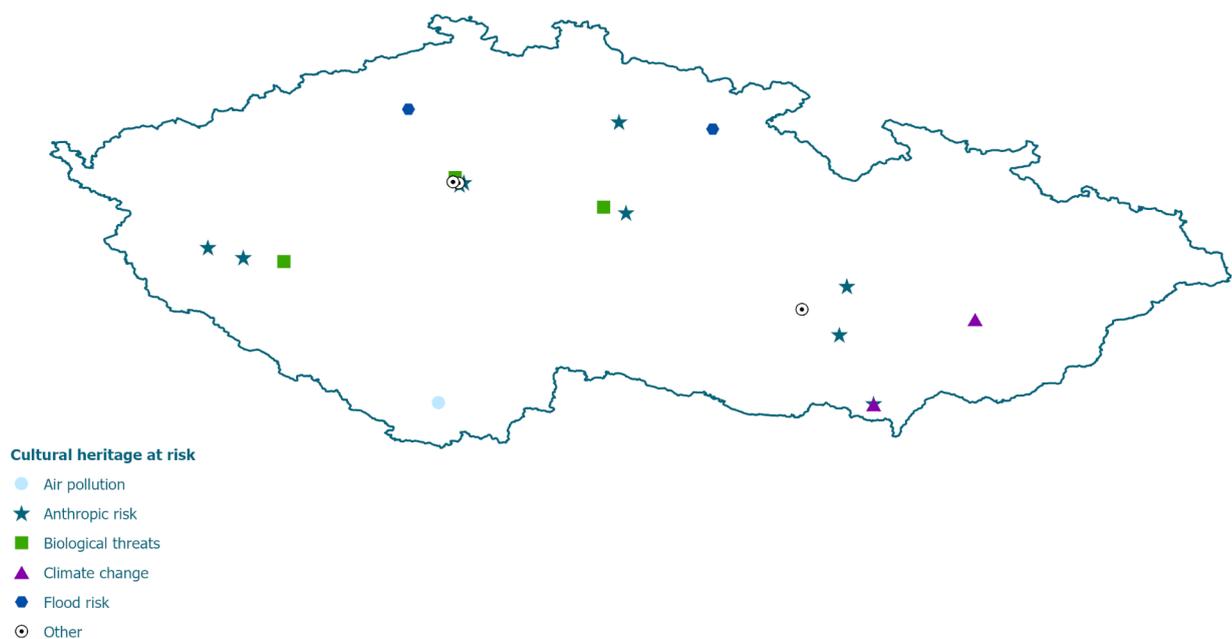
Figure 8 - Map of cultural heritage at risk in Czech Republic
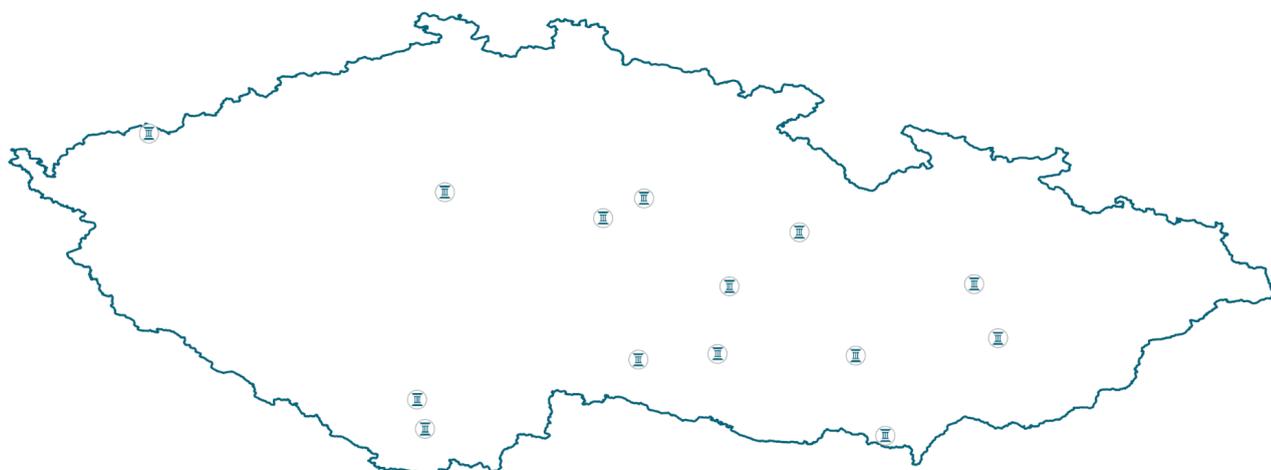
Figure 9 - Map of UNESCO sites in Czech Republic



Monuments and sites

Historic urban centres

Cultural landscapes

**45**% Anthropic

**15**% Biological

**15**% Other

**10**% Climate change

**10**% Flood

**5**% Pollution
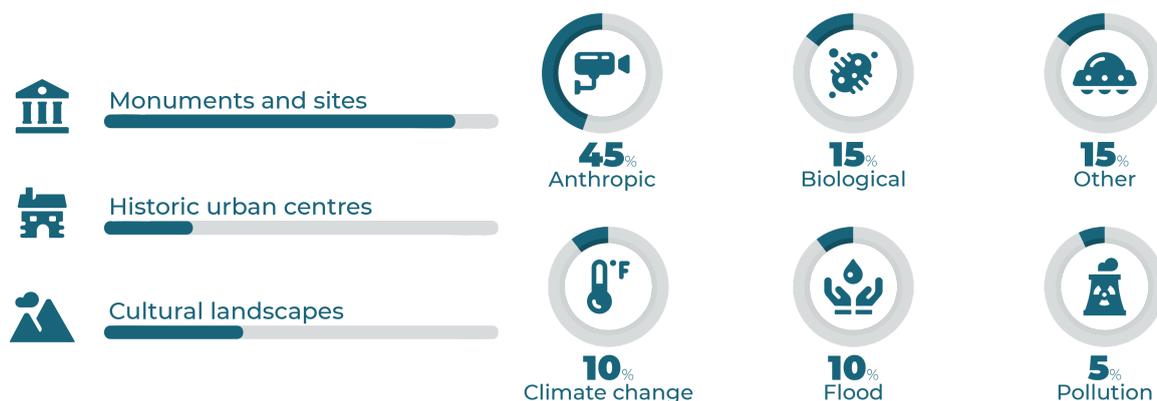
Figure 10 - Cultural heritage in Czech Republic sort by typologies and risks

Table 11 - List of cultural heritage at risk in Czech Republic from partners' survey response

| Site name | Location | Typology | Main risk |
|---|---|---|---|
| Nebílovy Castle | Nebilovi | Monuments and sites | Biological threats |
| Heavenly Father Chapel | Kutna Hora | Monuments and sites | Biological threats |
| Prague Historic Center | Prague | Historic urban centres | Anthropic risk |
| St. Ann's Church | Prague | Monuments and sites | Anthropic risk |

65

| Monastery of Kladruby | Kladruby | Monuments and sites | Anthropic risk |
|---|---|---|---|
| Chotesov Monastery | Chotesov | Monuments and sites | Anthropic risk |
| Český Krumlov Garden | Český Krumlov | Monuments and sites | Air pollution |
| Terezin Fortress | Terezin | Monuments and sites | Flood risk |
| Kuks Forest Sculptures | Kuks | Monuments and sites | Flood risk |
| Porta Coeli Monastery | Tišnov-Predklášterí | Monuments and sites | Other |
| Troja Chateau | Prague | Monuments and sites | Biological threats |
| Dolni Kounice Synagogue | Dolni Kounice | Monuments and sites | Other |
| Tugendhat Villa | Brno | Monuments and sites | Anthropic risk |
| Jičín Synagogue | Jičín | Monuments and sites | Anthropic risk |
| Cáslav Synagogue | Cáslav | Monuments and sites | Anthropic risk |
| Boskovice Synagogue | Boskovice | Monuments and sites | Anthropic risk |
| St. Vitus' Cathedral, Prague Castle | Prague | Monuments and sites | Other |
| Lednice–Valtice Cultural Landscape | Lednice and Valtice | Cultural landscape | Climate change |
| Kroměříž Archbishop's Palace | Kroměříž | Monuments and sites | Climate change |

**Targeted country: Germany**

The prevailing risks arising from the mapping of cultural sites at risk in Germany concern natural ageing. No particular problems emerge from the German case apart from the deterioration related to maintenance and weather (figs. 11-12-13). This is the reason why there is a high number of restoration and maintenance.

The risks are linked to humidity and water infiltration. The effects of urbanisation also fall in the German case in urban historic centres as in the case of Dessau-Görlitz.

On the other hand, surveys by ICOMOS Germany denounce critical issues relating to the state of abandonment of some sites of historical and cultural interest linked to the urban heritage, such as the Bad Neuenahr thermal baths, the Hamburg synagogue and St. Hedwig's Cathedral and the Roundhouse factory in Berlin. Architectural sites of historical-social and historical-religious importance of the

aforementioned German cities, which have found themselves over time in a state of neglect and decay. The decision of the public authorities to start demolition or residential refurbishment of the aforementioned architectural sites was reported in the ICOMOS Germany Heritage at Risk 2016-2019 report denouncing the risks associated with the loss of cultural and social evidence that characterise the identity of German cities throughout history. Additional risks derive from human action linked to the redevelopment of urban areas subject to degradation and acts of vandalism.
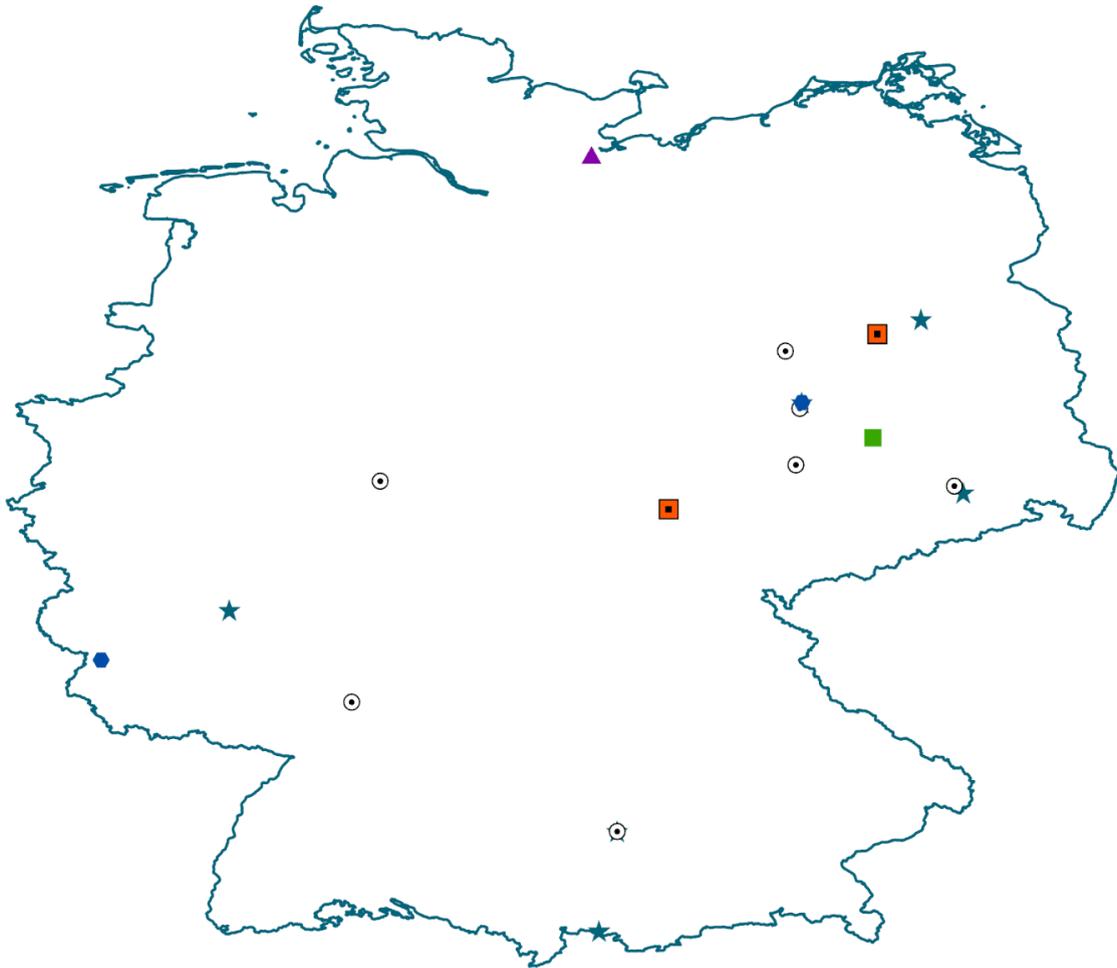
**Cultural heritage at risk**

★ Anthropic risk
■ Biological threats
▲ Climate change
■ Fire risk
⬠ Flood risk
⊙ Other

Figure 11 - Map of cultural heritage at risk in Germany
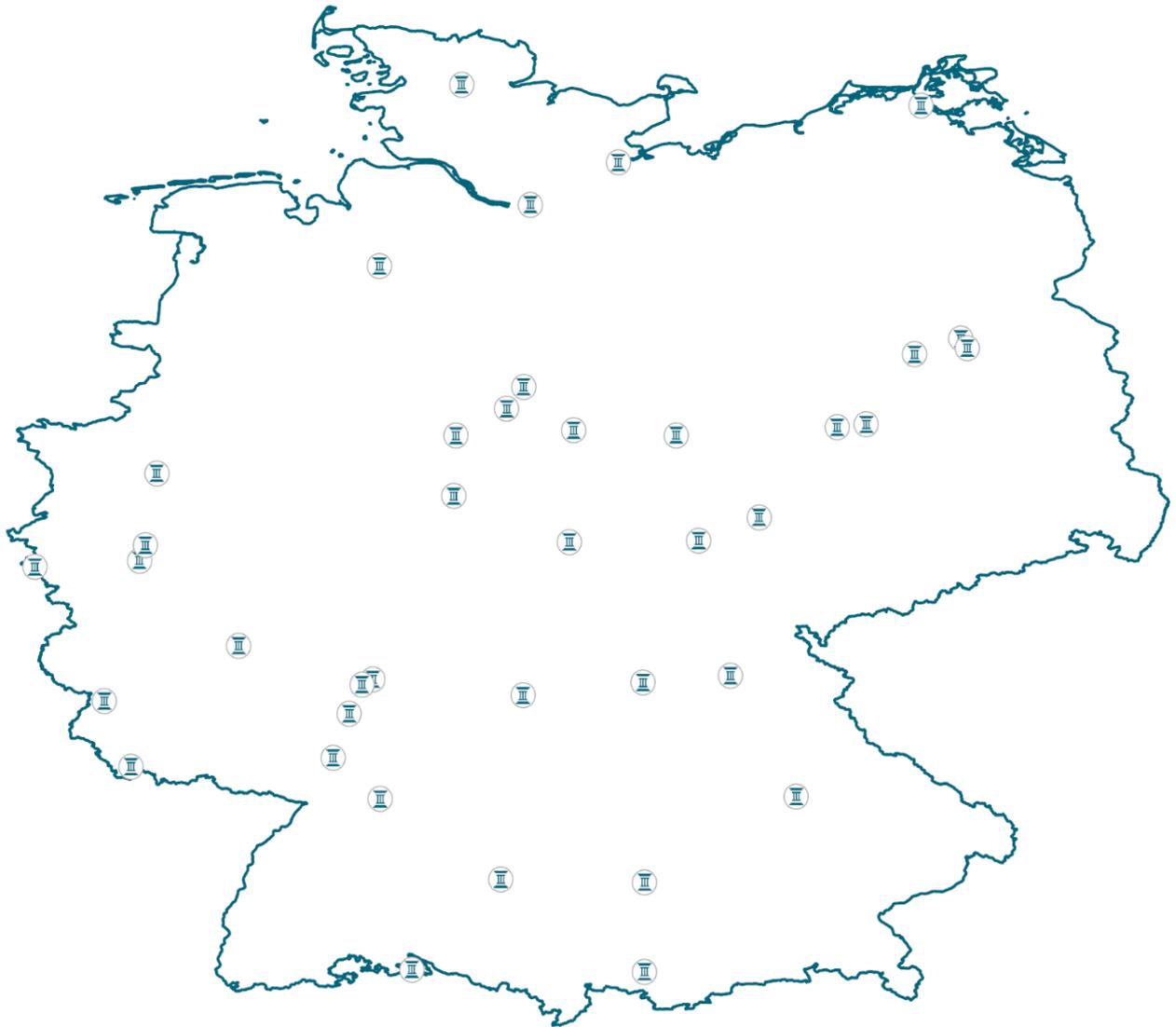
Figure 12 - Map of UNESCO sites in Germany
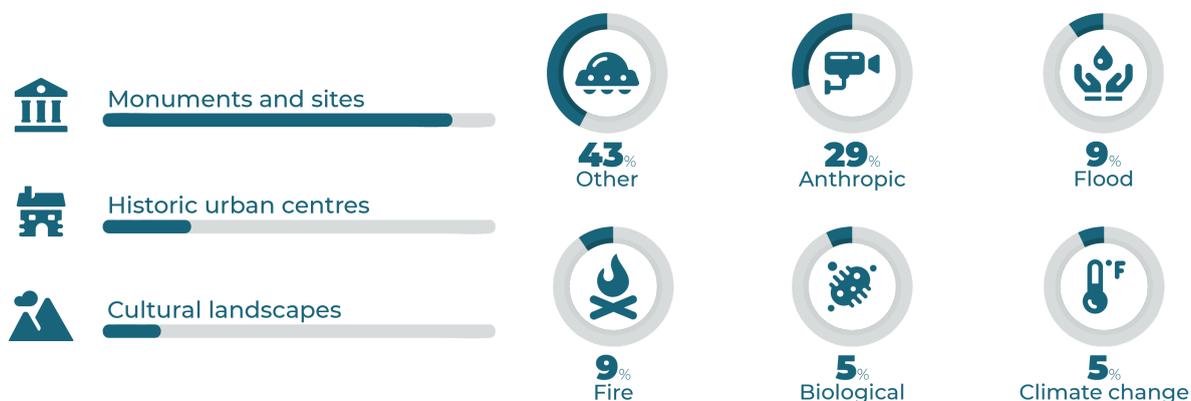
Figure 13 - Cultural heritage in Germany sort by typologies and risks

Table 12- List of cultural heritage at risk in Germany from partners' survey response

| Site name | Location | Typology | Main risk |
|---|---|---|---|
| Thomaskirche | Leipzig | Monuments and sites | Other |
| Karl-Theodor Bridge | Heidelberg | Monuments and sites | Other |
| Gartenreich Dessau-Wörltz | Dessau | Monuments and sites | Anthropic risk |
| Festspielhaus Hellerau | Hellerau | Monuments and sites | Anthropic risk |
| Gaslight and Gas Lamps of Berlin | Berlin | Monuments and sites | Anthropic risk |
| Oranienbaum Wörlitz | Wörlitz | Monuments and sites | Other |
| Voehl Synagogue | Voehl | Monuments and sites | Other |
| Fuggerhouse | Augsburg | Monuments and sites | Anthropic risk |
| Schaezler Palace | Augsburg | Monuments and sites | Other |
| New Palace in Sanssouci Park | Potsdam | Monuments and sites | Other |
| Burgkapelle Ziesar | Brandeburg | Monuments and sites | Other |
| Goethe Gallery in the Residenzschloss | Weimar | Monuments and sites | Other |
| Little Pheasant Castle of Moritzburg | Moritzburg | Monuments and sites | Other |

| | | | |
|---|---|---|---|
| Castle Hartenfels | Torgau | Monuments and sites | Biological threats |
| City of Lübeck | Lübeck | Historic urban centre | Climate change |
| Classical Weimar | Weimar | Historic urban centre | Fire risk |
| Upper Middle Rhine Valley | Upper Middle Rhine Valley | Cultural landscape | Anthropic risk |
| Neuschwanstein Castle | Neuschwanstein | Monuments and sites | Anthropic risk |
| Palaces and Parks of Potsdam and Berlin | Potsdam and Berlin | Monuments and sites | Fire risk |
| Roman Monuments, Cathedral of St Peter and Church of Our Lady in Trier | Trier | Monuments and sites | Flood risk |

## Targeted country: Austria

Even in the case of Austria there are no particular issues, except those related to causes of general risk such as water infiltration, humidity and air pollution (figs. 14-15-16). These are common risks in urban contexts, where cultural heritage is identified with the appearance of cities and places of life.

In the specific case of the historic centre of Vienna (included in the WHL-UNESCO) the risk is associated with the recent urban regeneration policies that threaten the aesthetic appearance of the city. Such is the reason why this site is the only one among the WHL of targeted countries included in the list of assets at risk (endangered risks).

In the context of targeted sites only one site is included in the list of Endangered sites: the historic centre of Vienna. The main threat to this site stems from risks of an anthropogenic nature linked to the growth of urban modernization projects that threaten the aesthetic and identity of the city. The inclusion of Vienna in the WHL is motivated by the historical and cultural development of its architecture over the centuries and the cultural role that the city has played in Europe for centuries. The Viennese case demonstrates how the management of tangible cultural heritage is closely linked to urban planning and management (ICOMOS - Heritage at risk 2016-2019).
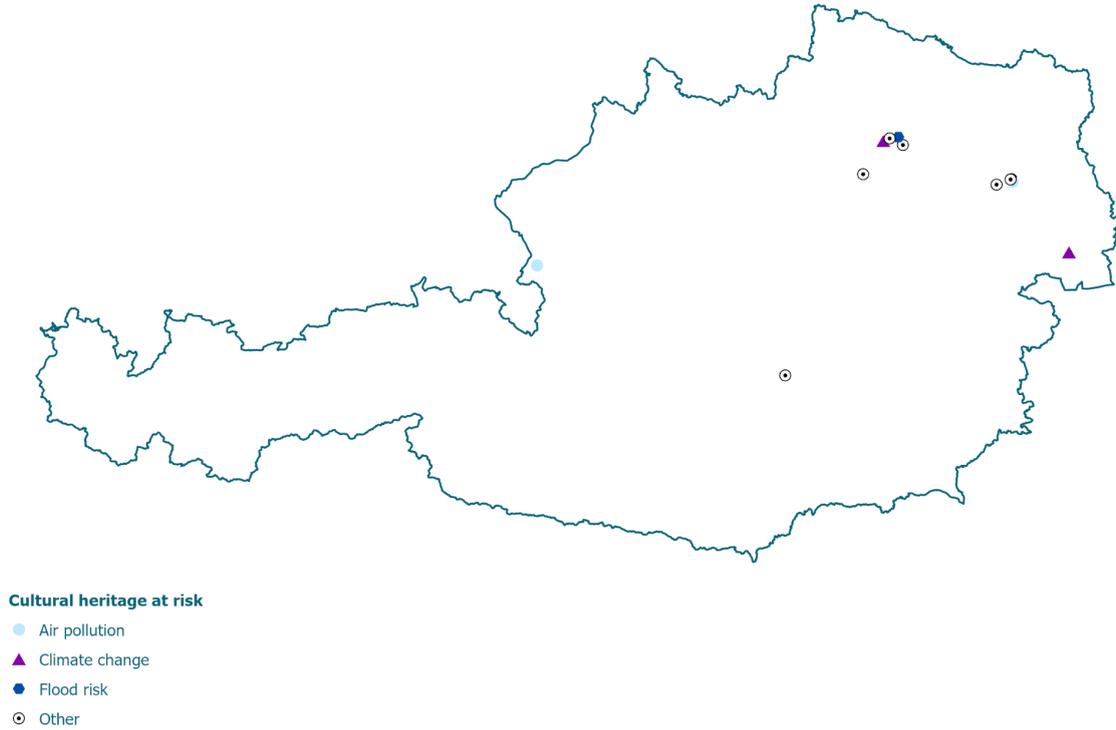
Figure 14 - Map of cultural heritage at risk in Austria
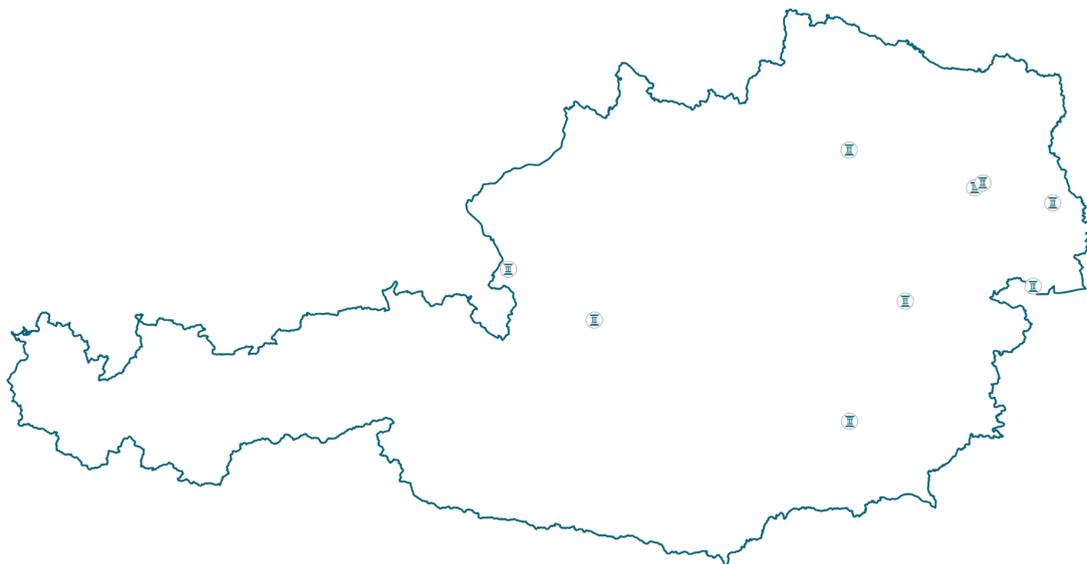


Figure 15 - Map of UNESCO sites in Austria

Monuments and sites

Historic urban centres

Cultural landscapes

Libraries and archives

58% Other

17% Climate change

17% Pollution

8% Flood
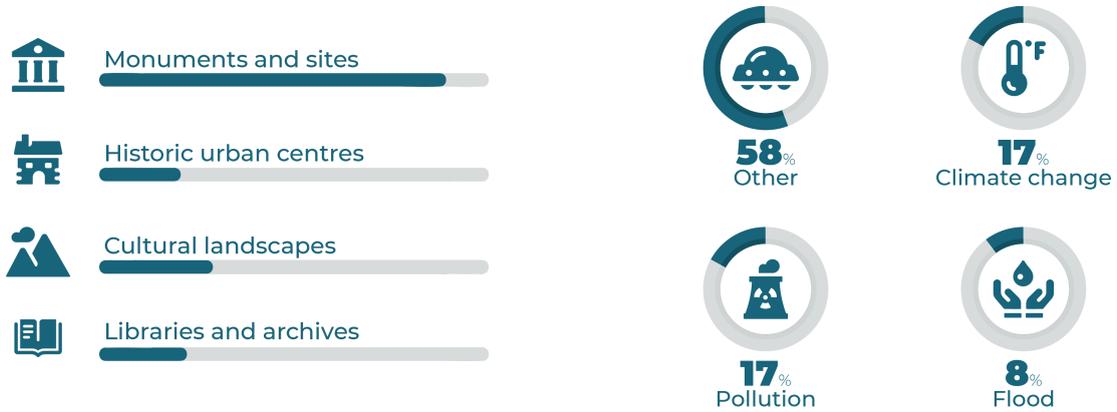
Figure 16 - Cultural heritage in Austria sort by typologies and risks

Table 13 - List of cultural heritage at risk in Austria from partners' survey response

| Site name | Location | Typology | Main risk |
|---|---|---|---|
| Franciscan Church | Wien | Monuments and sites | Other |
| Wiener Werkbundsiedlung | Wien | Monuments and sites | Other |
| Belvedere Palace & Gardens | Wien | Monuments and sites | Air pollution |
| Church of Our Immaculate Lady | Salzburg | Monuments and sites | Air pollution |
| Albertina | Wien | Monuments and sites | Other |
| Mausoleum of Duke Karl II, Seckau Abbey | Styria Region | Monuments and sites | Other |
| Wachau Region (UNESCO World heritage) | Wachau Region | Cultural landscape | Climate change |
| Stift Göttwig | Furth bei Göttweig | Libraries and archives | Other |
| Krems Stein | Krems an der Donau | Historic urban centre | Flood risk |
| Stift Melk | Melk | Monuments and sites | Other |
| Dürnstein | Dürnstein | Monuments and sites | Other |
| Fertö/Neusiedlersee Cultural Landscape | Fertö Neusiedlersee Region | Cultural landscape | Climate change |

## 5. Recognition of cultural institutions and organisations in targeted countries: Indications from partners towards potential interested actors in risk management on cultural heritage

Cultural institution recognition provides a mapping of potential stakeholders involved in the job market in the context of targeted countries. The mapping activity provides an overview of the essential characteristics of the stakeholders. First, the information collected by the survey provides information on the name and type of the organisation in order to understand the legal nature of the organisations. Secondly, the information describes the mission of the organisations to understand their purposes, especially on issues related to climate change and environmental sustainability. Finally, the type of cultural heritage to understand the scope of action and skills (museums, archival, pictorial, urban and landscape planning, among others).

From the survey carried out with the partners' collaboration, the mapping gives back a rather varied picture of institutions and organisations within the targeted

countries. The main distinction concerns organisations directly involved in climate change and risk management in cultural heritage and those that are not directly involved. These latter are organisations potentially interested in RMCH for their complementary skills and goals.

Of 157 recognized organisations, only 11 have in their mission objectives related to the management and protection of cultural heritage in the context of climate change and environmental risks. These mainly include research centres and public universities that study methodological and applicative solutions for the protection of cultural heritage and landscapes (table 14). Among the public stakeholders there is also the **German Federal Office for Civil Protection**, whose competence it covers disasters caused by nature, major accidents and other causes not related to war.

Table 14 - List of organisation directly involved in risk management for CH in targeted countries

| Organisation | Type | Country | Mission |
|---|---|---|---|
| Brandenburg Technical University (BTU) | University | Germany | BTU is a university of technology and develops practical application oriented solutions for the major global issues and transformation processes of the future with scientific competence. BTU is aware of special responsibility when it comes to forward-looking and sustainable progress in Germany. Interdisciplinary clusters and close collaborations with our partners from the business and science communities have promoted the emergence of a highly focused profile, international liaison and successful projects to overcome these challenges. |
| CNR-ISAC RICH | Research institute | Italy | Natural, environmental and anthropic risks to cultural heritage |
| Fachhochschule Potsdam | University | Germany | The Potsdam University of Applied Sciences (FHP) was founded in 1991 and is located in the north of Potsdam. The range of subjects includes information and engineering science, socio-cultural and design courses. In addition, there is a broad portfolio of transfer and further education offers. As an employer, the university offers attractive employment opportunities and development prospects. |
| Fraunhofer Institute for Building Physics IBP | Research institute | Germany | The focus of research institute work is on preventive conservation - i.e. finding ways to prevent damage to art and cultural assets in the long term by establishing suitable general conditions. This approach is also transferred and applied to the preservation of historical monuments and archaeological sites. |
| Rheinisch-Westfälische Technische Hochschule Aachen | University | Germany | At the Faculty of Architecture, a joint research field has set itself the task of contributing to the sustainable safeguarding of cultural heritage, especially in times of forced urbanisation - in the field of tension of the emergence of something new that respects and continues the traditional values and qualities in the building. |

| Technisches Museum Wien | Museum | Austria | As Austria's largest museum of science and technology, TMW sees itself as a place of learning and discourse within society that bridges the realms of science, education, economy and society. Its work is guided by the notion of "sustainability" in an effort to act in a future-oriented and socially effective manner. By way of a framework definition, TWM is guided by the Sustainable Development Goals (SDGs for short) adopted by the United Nations (UN). These goals represent a globally recommended agenda for sustainable development by 2030, in which 17 goals with ecological, economic and social fields of action have been defined. |
|---|---|---|---|
| University for Continuing Education Krems (formerly known as Danube University Krems) / Center for Cultural Property Protection | Research institute | Austria | Natural catastrophes, climate change and human-made disasters endanger not only our lives, but also cause damages to cultural properties or even lead to the permanent loss of our cultural heritage. Therefore, the safeguarding and protection of cultural goods require efficient management and appropriate protection measures. Strategies to prevent risks, mitigate damages and to reduce adverse impacts after disasters are of utmost importance.The Convention for the Protection of Cultural Property in the Event of Armed Conflict (The Hague 1954) and its two Protocols constitute the legal framework to prevent or mitigate adverse impacts on the cultural heritage. However, these instruments, being recognised as fundamental part of public international law, are not only applicable during armed conflicts, but set already widely accepted standards for the protection of cultural property during peacetime. |

In the private sector, on the other hand, three organisations operate, such as Fondo Ambiente Italiano (FAI - Italy), Museum for Future (Austria and Germany) and Society for International Cooperation GMBH (GIZ - Germany).

The FAI - Fondo per l'Ambiente Italiano is a non-profit foundation founded in 1975, on the model of the National Trust, with the aim of protecting and enhancing the Italian historical, artistic and landscape heritage.

Museum for Future is a non-profit organisation that aims: (1) to mobilise a global network of museum workers and institutions to participate in coordinated actions that put pressure on decision-makers to enact the Paris Climate Agreement; (2) to foster dialogue between museums, local communities, and the public about the ecological crisis and the diverse solutions to avert it, by emphasising the societal benefits of a sustainable transformation to activate and inspire.

GIZ is a global service provider of international cooperation for sustainable development with more than 50 years of experience in various fields, from economic and employment promotion to energy and environmental issues to the promotion of peace and security.

By widening the view to all the identified potential stakeholders, there is a variety of organisations of both public and private nature (Table 15).

Table 15 - Typologies of stakeholders from survey's partner response

| Stakeholders' typology | Total |
|---|---|
| Museum | 57 |
| Association and network | 21 |
| Foundation | 12 |
| Company | 11 |
| Research institute | 11 |
| Public/Governmental | 10 |
| Corporate Heritage and Historical Archive | 8 |
| Organisation | 6 |
| University | 6 |
| Non-profit organisation | 4 |
| Initiative and project | 3 |
| Academy of Fine Arts | 2 |
| Cultural institution | 2 |
| Historical Archive | 2 |
| Financial holding | 1 |
| Training centre | 1 |

The results summarised in table 15 attest to the clear prevalence of museum organisations among the types of stakeholders represented. Museums, monuments and artworks are among the types of cultural heritage best protected by the selected stakeholders. The latter are represented not only by individual museums but also by associations, national and international museum networks and private foundations.

The general framework of stakeholders is therefore mainly represented by public and private organisations or museum networks. Relevant differences are found, however, by analysing the internal situation of each target country.

**Stakeholders in Germany**

At the level of geographic distribution of stakeholders, there are no significant differences between the target countries. The country hosting the largest number of stakeholders is Germany (44), where the coexistence of public and private organisations is most evident.

Stakeholders are present in the form of associations and networks to systematise museums and professionals who promote the role of museums at a social level, the socio-economic impacts of cultural heritage or who offer standardisation services on products and materials used in the artworks. As many as 13 associations in the Cultural Heritage sector out of 21 identified are based in Germany. Here is also the largest number of stakeholders engaged in facing the effects of climate change on cultural heritage (6 out of 11 total). Germany is also home to various international organisations, such as ICOM and ICOMOS, and multidisciplinary (technical and socio-humanistic) research centres for the protection of cultural heritage. These include: German Archeological Institute, to facilitate research and scientific dialogue in archeology worldwide; Fraunhofer Institute for Building Physics IBP, for the prevention of damage to monuments and long-term artworks; Roman-Germanic Central Museum (RGZM), which adopts a technical-humanistic approach to research relating to the restoration of artworks; German Academic Exchange Service (DAAD), which favours cultural and academic exchanges in the fields of museology, conservation and management; Koldewey Society, which fosters international cooperation in architecture.

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Table 16 - List of surveyed stakeholders and organisation in Germany

| Organisation | Typology | Mission |
|---|---|---|
| German Museum Association - Deutscher Museumsbund | Association and network | For museums. With museums. In your interest. We are committed to a diverse and sustainable museum landscape and to the interests of museums and their employees |
| Museumsbund | Association and network | The Deutsche Museumsbund eV has represented the interests of German museums and their employees since 1917. It connects people, diverse institutions and relevant topics related to museums. |
| International Association of Transport and Communications Museums (IATM) | Association and network | IATM is the umbrella organisation of international museums and has more than 100 members by now. Communication and cooperation are the main requests of the IATM to support the represented museums in their aims and tasks. |
| Association of restorers (VDR) | Association and network | As a professional and specialist association, the VDR represents the professional and specialist interests of around 3,000 restorers from all disciplines in Germany. The main concerns of the VDR are the protection and proper preservation of art and cultural assets while respecting their material, art-historical and aesthetic importance. |
| Hessian Museum Association | Association and network | The association promotes Hesse's cultural heritage, which is reflected in a variety of ways in the state's museums and collections. He organises the technical advice of the museums in Hesse and offers further training for museum employees. |
| Conference of Museum Advice Centers in the Federal States (KMBL) | Association and network | The common subject areas of the KMBL are advising museums in the areas of collecting and preserving, documenting and researching, exhibiting and mediating, legal and operational organisation of the museum. |
| Konferenz nationaler Kultureinrichtungen Germany | Association and network | The task of the KNK is to promote and secure the preservation and development of the cultural heritage of the cultural institutions in the East German federal states classified as "nationally important" in the Blue Book. The aim is to anchor the museums, collections, archives and garden realms in the consciousness of politicians and the public in the long term. |
| Prussian Cultural Heritage | Cultural institution | The Stiftung Preussischer Kulturbesitz (Prussian Cultural Heritage Foundation) is an internationally renowned cultural institution and an important player in the humanities and the social sciences. It includes museums, libraries, archives, and research institutes. |

| | | |
|---|---|---|
| Seiten des Bundesverbandes Museumspädagogik | Association and network | The federal association initiates further training and research on museum education, promotes professional exchange, in particular through annual specialist conferences, publishes the specialist journal "Standbein Spielbein" and develops nationwide and international projects in cooperation with educational institutions, institutions and associations that work in the field of museums and culture. With its work, the Bundesverband Museumspädagogik contributes to the quality of cultural education in museums and the development of new, future-oriented concepts of museum work. |
| Federal Office for Civil Protection | Public/Governmental | The Federal Office for Civil Protection is in charge of civil protection in Germany. Disaster management covers disasters caused by nature, major accidents and other causes not related to war. |
| German Foundation for Monument Protection (DSD) | Foundation | The German Foundation for Monument Protection is the largest private initiative for the preservation of monuments in Germany. It campaigns independently throughout Germany for the preservation of threatened architectural monuments of all kinds. The German Foundation for Monument Protection is the largest private sponsor for the preservation of monuments in Germany. In addition, it is a knowledge centre for monument theory and monument practice. The "DenkmalAkademie" is the training institute of the German Foundation for Monument Protection for in-service training in the preservation of monuments. |
| Gerda Henkel Foundation | Foundation | The Gerda Henkel Foundation is one of the largest scientific foundations in Germany. The core areas of funding – support for research projects and the awarding of doctoral and research grants – have repeatedly been expanded to include further funding initiatives. |
| museum-digital | Initiative and project | museum-digital is a platform on which museums large and small publish information about their objects. It contains a large variety of objects that are linked with each other through many different links. It thus aims to present subjects in a most approachable way and provide ease in the finding of objects |
| Beauftragter der Bundesregierung für Kultur und Medien Germany | Public/Governmental | |
| CEN | Association and network | CEN, the European Committee for Standardization, is an association that brings together the National Standardization Bodies of 34 European countries. CEN provides a platform for the development of European Standards and other technical documents in relation to various kinds of products, materials, services and processes. |
| Horst Janssen Museum | Museum | The Horst-Janssen-Museum is dedicated to the visual arts on paper. It is named after the great North German illustrator, etcher, woodcutter, poster artist, illustrator, author and graphic artist Horst Janssen. The museum offers an exciting encounter with the work and personality of this unconventional artist. |

| | | |
|---|---|---|
| LWL - Industriemuseum Zeche Hannover | Museum | With its massive Malakov tower, the Hannover colliery in Bochum is reminiscent of a mediaeval castle, although It was only built in the mid-19th century. The hoisting technology invented here was innovative and is still in use all over the world today. During demonstrations the large traction sheave on the steam engine rotates in the engine house. Built in 1893, it is the oldest example of its type still at its original location in the Ruhrgebiet . A highlight for the children is "Zeche Knirps", our mining playground. |
| State Textile and Industry Museum Augsburg | Museum | Rattling looms, creative fashion laboratory, modern high-tech: tim, the young Augsburg Textile and Industrial Museum, which opened in January 2010, connects the rapid development of the local textile industry with an exciting trip into the history of fashion and clothing over the past two centuries. |
| Clemens Sels Museum Neuss | Museum | The Clemens Sels Museum Neuss, with its annex Feld-Haus – Museum for Popular Prints, the archaeological excavations in the Romaneum and the "Fossa Sanguinis" pavilion, is a modern multi-sector building with a focus on art. |
| State Museums in Berlin | Museum | The National Museums in Berlin, with their facilities that have grown over generations, form a universal museum for the preservation, research and communication of art and cultural treasures from the entire history of mankind. |
| Berlin State Museums | Museum | With its numerous institutions that have evolved over generations, the Staatliche Museen zu Berlin constitutes an encyclopaedic museum, spread over many different sites, that aims to preserve, research, and display art treasures and cultural artefacts dating from all human history, and educate the public about their importance. The Staatliche Museen zu Berlin's collections encompass the fields of European and non-European art, archaeology and ethnology from virtually all nations, cultures, and periods. |
| Emergency networks | Association and network | Joint portal of the emergency groups for the protection of cultural property in Germany. An emergency association is an association of several museums, archives and/or libraries at a local or regional level. This also includes cooperation with the local emergency services. |
| NEMO | Association and network | NEMO ensures museums are an integral part of European life by promoting their work and value to policy makers and by providing museums with information, networking and opportunities for cooperation. |
| Ice Age Europe | Association and network | The Ice Age is one of the most fascinating periods in early human history. The foundations of our culture today were established during more than two million years of Ice Age history; its relics are among the key testimonies of our cultural heritage and of human development. |

| ICOM | Organisation | The International Council of Museums is an international organisation of museums and museum professionals which is committed to the research, conservation, continuation and communication to society of the world's natural and cultural heritage, present and future, tangible and intangible. |
|---|---|---|
| Archaeological Heritage Network (ArcHerNet) | Organisation | As the first of its kind, it bundles German competencies in the field of cultural preservation and protection of cultural assets abroad. |
| German Commission for UNESCO (DUK) | Organisation | The German Commission for UNESCO (DUK) was founded on May 12, 1950 – even before the Federal Republic of Germany joined UNESCO on July 11, 1951. The German Commission for UNESCO is Germany's intermediary organisation for multilateral politics in education, science, culture and communication . Its task is to advise the Federal Government, the Bundestag and the other responsible bodies on all questions arising from the Federal Republic of Germany's membership of UNESCO. The DUK is funded by the Federal Foreign Office. |
| ICOMOS | Organisation | ICOMOS is the international non-governmental organisation that works worldwide for the protection and care of monuments and monument areas and the preservation of historical cultural heritage. ICOMOS participates in the work of the World Heritage Committee and in the fulfilment of the UNESCO Convention on World Heritage as an advisor and expert. |
| Society for International Cooperation GMBH (GIZ) | Organisation | GIZ is a global service provider of international cooperation for sustainable development with more than 50 years of experience in various fields, from economic and employment promotion to energy and environmental issues to the promotion of peace and security . |
| CulturalHeritage.news | Initiative and project | Germany supports projects all over the world aiming at the protection, preservation and promotion of cultural heritage. These projects take place in diverse cooperations and at the invitation of host and partner countries. The large number of major and smaller projects however makes it difficult to be aware of the variety of the cooperations. CulturalHeritage.news provides a platform to report about these projects. Articles in English can be sent to culthernews@dainst.de. |
| DIN | Non-profit organisation | DIN Standards are the results of work at national, European and/or international level. Anyone can submit a proposal for a new standard. |
| SiLK | Initiative and project | The "SiLK - Safety Guideline for Cultural Assets" project offers practical "help for self-help" and supports all those who have the task of preserving the collections in museums, archives and libraries and the buildings, gardens and facilities. The focus is on the principle of prevention. For this purpose, SiLK offers an interactive tool that imparts knowledge and practical experience and is at the same time a platform for the exchange on all questions of cultural property protection and museum security. |

| Leibniz Association | Association and network | The Leibniz Association connects 97 independent research institutions that range in focus from natural, engineering and environmental sciences to economics, spatial and social sciences and the humanities. Leibniz Institutes address issues of social, economic and ecological relevance. |
|---|---|---|
| German Archaeological Institute (DAI) | Research institute | The mission of the German Archaeological Institute (DAI) is to conduct and facilitate research worldwide in the archaeological sciences and classical studies. Through its research projects the DAI creates an important foundation for dialogue between cultures, for international scientific collaboration and for the preservation of cultural heritage. |
| Fraunhofer Institute for Building Physics IBP | Research institute | The focus of research institute work is on preventive conservation - i.e. finding ways to prevent damage to art and cultural assets in the long term by establishing suitable general conditions. This approach is also transferred and applied to the preservation of historical monuments and archaeological sites. |
| Roman-Germanic Central Museum (RGZM) | Research institute | In the interest of gaining knowledge, we combine the humanities and natural sciences while fundamentally incorporating our restoration-technical expertise in an interdisciplinary approach that overcomes the boundaries of the different scientific cultures. |
| German Academic Exchange Service (DAAD) | Research institute | The DAAD is the world's largest funding organisation for the international exchange of students and scientists. The DAAD-funded courses in building research, conservation, site management or museology, which are jointly run by universities in Germany, Egypt and Jordan, are intended to train those experts who will be needed to make the right decisions in a "zero hour". and to be able to act concretely and professionally. |
| Koldewey Society | Research institute | Its goals are the promotion and maintenance of work in all areas of building research and excavation as well as participation in questions of art and monument preservation, the participation of trained architects in such research in joint responsibility, training in the field of building research, admission and maintenance foreign connections with the aim of international cooperation. |
| German National Committee for the Protection of Monuments (DNK) | Public/Governmental | Since its foundation in 1973, the German National Committee for the Protection of Monuments has formed a bracket at the federal level around the essentially federally shaped preservation of monuments. |
| Fachhochschule Potsdam | University | The Potsdam University of Applied Sciences (FHP) was founded in 1991 and is located in the north of Potsdam. The range of subjects includes information and engineering science, socio-cultural and design courses. In addition, there is a broad portfolio of transfer and further education offers. As an employer, the university offers attractive employment opportunities and development prospects. |

| Institut für Kultur-und Medienmanagement (KMM) | University | The studies in Arts and Media Management qualify persons already holding a university degree to practise in arts management positions. Between 20 and 25 students per year from home and online from abroad take up studies in Arts and Media Management at the University of Music and Theatre Hamburg (HfMT). The course takes 4 semesters and leads to the diploma of "Master of Arts". |
|---|---|---|
| Brandenburg Technical University (BTU) | University | We are a university of technology and develop practical application oriented solutions for the major global issues and transformation processes of the future with scientific competence. We are aware of our special responsibility when it comes to forward-looking and sustainable progress in our region. Interdisciplinary clusters and close collaborations with our partners from the business and science communities have promoted the emergence of a highly focused profile, international liaison and successful projects to overcome these challenges. |
| EUNICE (European UNIversity for Customised Education) | University | designed to solve social and economic challenges, both globally and locally. The alliance is nurtured by seven universities' intellectual and infrastructure input, resulting in a solid network of crossed interactions between educational institutions, industry and business partners, as well as other social, cultural, artistic and sports stakeholders. |
| Rheinisch-Westfälische Technische Hochschule Aachen | University | At the Faculty of Architecture, a joint research field has set itself the task of contributing to the sustainable safeguarding of cultural heritage, especially in times of forced urbanisation - in the field of tension of the emergence of something new that respects and continues the traditional values and qualities in the building. |

## Stakeholders in Italy

The second country for the number of stakeholders detected is Italy (41). Also in the Italian case, there is a strong presence of private stakeholders such as corporate foundations that preserve the corporate and family documentary heritage (corporate and familiar heritage). These foundations represent an Italian peculiarity, as attested by **Associazione Archivio Storico Olivetti, Archivio Storico e Museo Birra Peroni, Archivio Storico ENI and Assicurazioni Generali.**

In the cultural heritage sector, technical and technological consultancy companies operate for the restoration and conservation of artworks and library materials, logistics and data storage to support cultural management. Other private companies offer training services for professionals in the cultural sector (**IED, Fitzcarraldo Foundation**).

The public sector plays a role of government and regulation linked to the Ministries and local authorities with responsibility for cultural heritage and the landscape. Many of the national museum galleries (such as, **Museo Nazionale Romano and Galleria Nazionale di Arte Moderna e Contemporanea in Rome or Galleria Uffizi in Florence**) and research institutes are of a public nature. These include: (1) **National Council of Research (CNR)**, whose research on cultural heritage focuses on technologies for diagnostics and monitoring; (2) **Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA)** which monitors and evaluates the effects of environmental risks (seismic, hydrogeological but also atmospheric pollution and anthropogenic pressure) on cultural heritage.

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Table 17- List of surveyed stakeholders and organisation in Italy

| Organisation | Typology | Mission |
|---|---|---|
| Accademia di Belle Arti Aldo Galli - IED Network | Academy of Fine Arts | Aldo Galli Academy of Fine Arts in Como has been part of the IED network since 2010 and represents a reality of excellence in the field of Higher Artistic Education. Recognized by MIUR, its primary objective is to enhance the culture of Made in Italy with a particular focus on innovation in fashion, visual arts and the conservation of cultural heritage. The added value to teaching consists in the laboratory activities that develop immediately through collaborations with companies, organisations and institutions in the area for the development and professionalism of each individual student. |
| Accademia Albertina delle Belle Arti di Torino | Academy of Fine Arts | The Albertina Academy is the primary seat of higher education, specialisation and research in the artistic sector, and carries out related production activities. |
| ADSI | Association and network | The Associazione Dimore Storiche Italiane (A.D.S.I.) brings together the owners of historic properties throughout Italy, which are an important part of our cultural heritage. |
| Registrarte | Association and network | Registrarte is the association that brings together all those who work in museums, foundations and companies, public and private, for the management and handling of cultural assets such as works of art, museum collections in general and for the organisation of exhibitions. |
| Prodoc | Company | To recover and restore paper and digital archives, libraries and all paper and parchment materials |
| Art Defender | Company | The only company in Italy that offers integrated services for art collection management. Art Defender was born in 2008 from an idea of its founder, Alvise di Canossa, and from another successful entrepreneurial experience: that of Arterìa, today one of the world's leading players in the art logistics sector. |
| Fercam | Company | Thanks to the 5 specialised divisions, Fercam provides a complete logistics service: efficiently managing every phase of your supply chain, from the entry of goods to delivery. In all our activities, we always keep an eye on the environment and Fercam are constantly looking for innovative tools and new technologies to improve our service, with a view to sustainable development. |
| Open Care | Company | Open Care is the only company in Italy to offer integrated services for art collection management. It represents a single point of contact for individuals and institutions that care and enhance the value of works of art and collections. It has facilities equipped with the best technologies and internal staff specialised in conservation, handling and consultancy for tailor made services |

| | | |
|---|---|---|
| SpeakArt | Company | No more doubts about works of art: with SpeakART, art speaks for itself! The software is able to link certificates, information and documentary evidence of the work to the work itself. It therefore becomes an essential resource for cataloguing and research. All data can be extrapolated and used by users at will. How to read them? Simply by photographing the work of art. |
| MaKros | Company | The supply of compactable storage systems with Zero fire load is supported by a very balanced cost-benefit ratio, as it allows the end user to maximise the storage capacity in the premises without exceeding the permitted fire load limits. |
| CEAM Group | Company | Ceam Heritage is a multidisciplinary team specialised in the cultural heritage sector, made up of experts in the sector, and CEAM technicians able to analyse and support with products and services any need for monitoring, microclimatization, conservation, exhibition and restoration, transforming the various needs into solutions. |
| Archivio Storico Touring Club Italiano | Corporate Heritage and Historical Archive | Tourism and travel archive, corporate archive, editorial archive. The TCI archive brings together these three identities in a transversal way, thus representing a unicum in the national panorama that finds the greatest reason for interest precisely in this unprecedented intertwining of perspectives. |
| Associazione Archivio Storico Olivetti | Corporate Heritage and Historical Archive | Since 1998 the Olivetti Historical Archive Association collects, preserves and enhances the heritage documentary concerning the history of the Olivetti Company. |
| Archivio Storico e Museo Birra Peroni | Corporate Heritage and Historical Archive | It is the place where we keep the stories of innovation, audacity and vision that animate the entrepreneurial story of Birra Peroni, from 1846 to today. In the papers and in the iconographic and object heritage kept in the Historical Archive and in the Museum, all the key moments and choices of our company history are collected, rare and precious testimonies that accompany fundamental stages of Italian economic, industrial and cultural history. |
| Archivio Storico Eni | Corporate Heritage and Historical Archive | Eni's archival heritage tells the story of the Italian oil industry from its origins, in the Emilian Apennines, to the conquests of the most remote places on earth, with documents, images and testimonies of the protagonists |
| Museo Archivio Storico del Banco di Napoli | Corporate Heritage and Historical Archive | ilCartastorie, the Banco di Napoli Historical Archive Museum, was created to enhance the enormous heritage of stories and characters preserved in the writings of the ancient Neapolitan public benches. IlCartastorie, using every available dissemination channel, from multimedia to creative writing, returns to the city and to the whole world the voices, narratives and events immortalised on the countless pages of the times of the Banco di Napoli Historical Archive. |
| Assicurazioni Generali - Corporate Heritage and Historical Archive | Corporate Heritage and Historical Archive | The Generali Group opens the doors of its cultural heritage for an exciting journey through history and beauty. A heritage made up of paintings, sculptures, archaeological finds, books and historical documents, evidence of |

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| | | Generali's constant investment in culture since 1831. A living heritage, with many stories that tell a great company reality, but also the daily experience and progress of people in Italy, in Europe and in the world. |
|---|---|---|
| Fondazione Mansutti | Corporate Heritage and Historical Archive | It is a cultural institution committed to protecting, enhancing and disseminating its book, museum and archival heritage to make it a point of reference for analysis and research in the history of insurance. |
| Polo del 900 | Cultural institution | The Polo del '900 is an innovative, dynamic and open cultural centre, aimed above all at the new generations and new citizens, committed to promoting the civic and cultural growth of citizenship in relation to present and future issues of society starting with a reflection on history of the '900. |
| Veneranda Fabbrica del Duomo di Milano | Foundation | The Veneranda Fabbrica del Duomo di Milano is an ecclesiastical body endowed with legal personality by ancient statutory determination with the purpose of worship and religion, which excludes all profit-making activities. |
| Fondazione Scuola dei Beni e delle Attività Culturali | Foundation | Fondazione Scuola dei beni e delle attività culturali is a foundation dedicated to training, research and higher education, founded by the Italian Ministry for Culture. |
| LINKS - LEADING INNOVATION & KNOWLEDGE FOR SOCIETY | Foundation | LINKS Foundation was born from a deal between the San Paolo Company and the Polytechnic University of Turin. The Foundation has been operating at a national and international level for about 20 years in applied research, innovation and technology transfer. |
| Fondazione Fitzcarraldo | Foundation | Fitzcarraldo Foundation is an independent centre that carries out planning, research, training and documentation activities on management, economy and culture, arts and media policies. The aforementioned activities are carried out for the benefit of those who create, practice, participate, produce, promote and support the arts and cultures with particular attention to disadvantaged social groups and as such excluded or in conditions of difficulty in accessing artistic practice and fruition. of cultural assets and activities. |
| Fondazione Musei Senesi | Foundation | Siena's small museums - civic, diocesan, university or belonging to other institutions - dot the most authentic villages of the Sienese territory and host works, objects and documents from churches, palaces, private collections, and archaeological excavations a few metres away. This is the meaning of "widespread museum", in direct contact with the original places of the collections and in a continuous rediscovery of the landscape and local identity. |
| FAI – Fondo Ambiente Italiano | Foundation | The FAI - Fondo per l'Ambiente Italiano is a non-profit foundation founded in 1975, on the model of the National Trust, with the aim of protecting and enhancing the Italian historical, artistic and landscape heritage. |
| ASAC Archivio Storico delle Arti Contemporanee | Historical Archive | The Archivio Storico delle Arti Contemporanee (ASAC) protects, preserves and enhances the documentary heritage of the Venice Biennale and the arts of the twentieth century, collected from 1895 to today. The ASAC, in addition to conservation, cataloguing, inventory and research, enhances the documentary heritage produced by the Biennale. |

| | | He curates directly promoted exhibitions and collaborates with the various sectors of the Foundation to organise the events. The promotion of heritage is also carried out outside the Foundation, through the circulation of documents and works on loan to Italian and foreign institutions. |
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| Fondazione Pirelli | Corporate Heritage and Historical Archive | The Pirelli Foundation carries out numerous activities to enhance the company's assets such as the curation of publications, the organisation of exhibitions and conferences, as well as guided tours that involve thousands of people every year, also making use of the collaboration of other cultural institutions. |
| MAXXI | Museum | Promoting the current creative expressions of a nation such as Italy, characterised by centuries of primacy in the artistic and architectural fields, and projecting it towards the future. |
| Museo Nazionale della Scienza e della Tecnologia Leonardo da Vinci | Museum | The National Museum of Science and Technology (then Technical) "Leonardo da Vinci" was born on February 15, 1953. Employees and collaborators of the Museum directly think, develop and carry out daily activities and large-scale projects. These internal resources are joined by institutions, companies, professionals, scholars and researchers, volunteers who complete the network with which the Museum carries out its mission. |
| ADI Design Museum | Museum | The ADI Design Museum was created to showcase the entire repertoire of projects in the historical collection of the Compasso d'Oro award. This award was created in 1954 thanks to an idea by Gio Ponti to promote the quality of Made in Italy design and today it is the oldest and most authoritative form of recognition within the industry worldwide. |
| Gallerie dell'Accademia di Venezia | Museum | The Gallerie dell'Accademia of Venice constitutes the most important collection of Venetian painting in the world. |
| Museo Nazionale Romano | Museum | The Museo Nazionale Romano has as its mission the acquisition, conservation, enhancement and use of a unique cultural heritage in the world. This exceptional testimony of the past is promoted and developed by the National Roman Museum, projecting the sense of historical continuity into the future. |
| Galleria Nazionale di Arte Moderna e Contemporanea di Roma | Museum | The National Gallery of Modern and Contemporary Art in Rome, located near Valle Giulia, with its 20,000 works including paintings, drawings, sculptures and installations, offers a broad view of art from the nineteenth century to the present day. It is the only national museum dedicated entirely to modern and contemporary art. Supported by the special autonomy of the Reform of the Ministry of Culture, the National Gallery is proposed as a place of research and experimentation in which to reflect on languages, exhibition practices and the role of the contemporary museum. |
| Museo Pecci | Museum | Center for Contemporary Art Luigi Pecci is the first Italian institution created from the outset with the aim of presenting, collecting, documenting and supporting research in the visual arts, cinema, music, performing arts, |

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| | | architecture, design, fashion and literature, as expressions of the contemporary world that put people in touch with the major themes of life and our society. |
| Museo Uffizi | Museum | The Gallery occupies the first and second floors of the large building constructed between 1560 and 1580 and designed by Giorgio Vasari. It is famous worldwide for its outstanding collections of ancient sculptures and paintings (from the Middle Ages to the Modern period). |
| MA*GA - Fondazione Galleria d'Arte Moderna e Contemporanea Silvio Zanella | Museum | The MA*GA Museum is one of the most important Italian contemporary art museums. The identity of the museum is intertwined with the history of the Gallarate Prize, founded in 1949 and still active today. The Museum, officially established in 1966 with the name of Civic Gallery of Modern Art of Gallarate, was in fact born with the works acquired during the first eight editions of the Prize. |
| Assobenefit | Non-profit organisation | Assobenefit is the first representative association of the Società Benefit in Italy and supports all the companies that have become benefits and those that recognize themselves in a market and social and economic growth model that places the common good at the centre of its action. In the international context, Assobenefit studies and facilitates this process of profound renewal of the global economy thanks to a network of institutional and civil society relations and partners. |
| CDEC - Fondazione Centro Di Documentazione Ebraica Contemporanea | Foundation | The CDEC Foundation is engaged in both historical and sociological research activities. The areas of his greatest interest are the history of the Shoah, the history and culture of the Jews in the contemporary age; the role in society and the image of Jews in Italian public opinion, from Unity to the present day. Particular research fields and projects guide the new acquisitions of the Library, influence those of the Historical Archive, contribute to the development of educational activities and the organisation of public events. |
| Villa Altieri - Palazzo della Cultura e della Memoria storica | Research institute | The monumental complex, which aims to offer exhibition spaces, diversified cultural and museum services to the citizens of Rome, the metropolitan area and schools, houses the Metropolitan City Library with the Historical Archive, the Study Center for literary research, linguistics and philology Pio Rajna, with the Dantesque Historical Library, the archaeological collection of Villa Altieri set up in a multimedia and interactive exhibition itinerary. |
| CNR-ISAC RICH | Research institute | Natural, environmental and anthropic risks to cultural heritage |
| ISPRA | Research institute | ISPRA works with numerous European and international environmental scientific and technical institutes and organisations, in the implementation of its institutional mandate and in cooperation with the Italian Ministry for the Environment, Land and Sea (MATTM), the Ministry of Agriculture, Food and Forestry (MIPAAF) and the Ministry of Education, University and Research (MIUR) . |

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**Stakeholders in Czech Republic**

The Czech Republic hosts 37 of the stakeholders surveyed. The relevant aspect is almost all public actors identified among the potential organisations to be involved in the job market. The public sector encompasses all aspects of national culture. Public institutions are linked to national and local museums, libraries and archives. Public museum institutions cover various aspects and sectors of Czech history and society, enhancing traditions, customs, craftsmanship that characterise the local culture.

Few stakeholders (4 out of 37) have a mixed profile. This is the case of associations that create local museums or associations of citizens that promote the protection of cultural heritage with bottom-up approaches.

Table 18 - List of surveyed stakeholders and organisation in Czech Republic

| Organisation | Typology | Mission |
|---|---|---|
| Czech Republicech Association of Museums and Galleries | Association and network | The role of this citizen association is to represent the museums and galleries in the Czech Republicech Republic, to endeavour for the development of museum administration and securing of the free creative work in museums and galleries, to protect the common interests and rights of these institutions following the principles stated by the ICOM Code of Ethics for Museums. |
| Regionální muzea - více než 1000 | Association and network | Regional Museums - more than 1000 |
| Regionální galerie - více než 100 | Association and network | Regional Galleries - more than 100 |
| Bishoprics | Association and network | Management of Religious CH |
| Národní památkový ústav | Public/Governmental | National Heritage Institute |
| Národní galerie | Museum | National Gallery |
| Národní muzeum | Museum | National Museum |
| Národní technické muzeum | Museum | National Technical Museum |
| Národní zemědělské muzeum | Museum | National Museum of Agriculture |
| Moravské zemské muzeum | Museum | Moravian Museum |
| Technické muzeum Brno | Museum | Technical Museum Brno |

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| Národní archiv | Museum | National Archives |
|---|---|---|
| Hustiské muzeum v Táboře | Museum | Husite Museum in Tábor |
| MUSEUM+ | Museum | MUSEUM+ |
| Muzeum Jana Amose Komenského | Museum | Jan Amos Komenský Museum |
| Muzeum loutkářských kultur | Museum | Museum of Marionette Culture |
| Muzeum romské kultury v Brně | Museum | Museum of Roma Culture Brno |
| Muzeum skla a bižuterie Jablonec | Museum | Museum of Glass nad Bijouterie |
| Muzeum umění Olomouc | Museum | Museum of Art Olomouc |
| Národní muzeum v přírodě | Museum | National Open Air Museum |
| Slezské zemské muzeum | Museum | Silesian Museum |
| Uměleckoprůmyslové museum v Praze | Museum | Art and Artisan Museum Prague |
| Moravská galerie v Brně | Museum | Moravian Gallery Brno |
| Národní knihovna ČR | Museum | Czech Republicech National Library |
| Moravská zemská knihovna v Brně | Museum | Moravian Library in Brno |
| Knihovna a tiskárna pro nevidomé | Museum | Library and Printing Office for Blinds |
| Institut umění - Divadelní ústav | Museum | Institute of Art - Theatre |
| Národní divadlo | Museum | National Theatre |
| Národní filmový archiv | Museum | National Film Archives |
| Národní ústav lidové kultury | Museum | National Institute of Folklore Culture |
| Památník národního písemnictví | Museum | The Museum of Czech Republicech Literature |
| Památník Terezín | Museum | National Cultural Monument Terezin |

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|---|---|---|
| Památník Ticha | Museum | National Cultural Monument Silence |
| Ministry of Cultural Heritage | Public/Governmental | Authority governing the CH sector |
| Regional governments | Public/Governmental | Local authorities supervising CH |
| Archeologický ústav AV ČR Praha | Public/Governmental | Institute of Archaeology Prague |
| Archeologický ústav AV ČR Brno | Public/Governmental | Institute of Archaeology Brno |

**Stakeholders in Austria**

A strong public component is also found in Austria, a country with the lowest number of stakeholders surveyed (35). Public institutions involve federal state-owned museums and archives. A large group of research institutes linked to universities or museum institutions is concentrated in Austria such as: Museum Booster, a research and consultancy company on digital communication for museums; European Research Center for Book and Paper Conservation-Restoration. The Center for Cultural Property Protection of the University of Krems is a centre specialising in research on the safeguarding and protection of cultural heritage from natural disasters.

Finally, Austria hosts a large group of companies with public participation for the management of local and regional cultural heritage.

Table 19- List of surveyed stakeholders and organisation in Austria

| Organisation | Typology | Mission |
|---|---|---|
| Museumsbund Österreich (Austrian Museums Association) | Association and network | The Museumsbund Österreich (Museums Association Austria) as a network and information platform of Austrian museums for Austrian museums works in close cooperation with the authorities responsible for museums in the federal states primarily on projects for the maintenance and improvement of the institutional quality of Austrian museums. We promote the exchange of ideas and experiences between colleagues from different museums and through our various information channels provide information on pragmatic approaches as well as larger theoretical issues concerning museums. |
| Conservators without frontiers | Association and network | The Association is established as a non-profit entity with the aim of rescuing written and graphic heritage using the most advanced methods available technologically and practised in the conservation-restoration profession. |
| Stiftung Esterhazy | Foundation | The incorporation of the historical estate of the Esterházy royal family into Austrian private foundations is carried out with the aim of unifying and preserving the estate for Austria, Burgenland, and the Pannonian region. Beginning in 1994, Melinda Esterházy established three indissoluble foundations. These foundations laid the groundwork for high-growth commercial enterprises, which today are instrumental to the success of the Group. |
| Mozarteum | Foundation | The Salzburg Mozarteum Foundation is a non-profit organisation that deals with the person and work of Wolfgang Amadé Mozart. With initiatives in the three core areas of concerts, Mozart museums and science, it bridges the gap between the preservation of tradition and contemporary culture. Its goal is to open up changing perspectives and new food for thought in dealing with the composer. |
| Bundesmuseen | Public/Governmental | A conglomerate of scientific institutions under public law owned by the federal government of Austria and administered by the Federal Ministry for Arts, Culture, Public Service and Sport based on the so called "Bundesmuseen Gesetzt 2022" (loosely translated to Federal Museums Act 2022) which specifies certain federal institutions as being independently administered with an independant legal status. |
| Ministry of Interior Austria | Public/Governmental | The Federal Ministry of the Interior is responsible for coordinating matters of state crisis management and state disaster control management, participation in event-related crisis management, international disaster relief and civil protection matters. |
| NÖKU Group | Financial holding | NÖKUGroup comprises more than 30 artistic and scientific institutions that have developed into strong brands. Most of them have a trans-regional or Central European reach and focus. These organisations are part of NÖKU Group and feel strongly connected through a common outlook. This approach is based on an understanding of the Group's role as a "challenging community" that has set itself the goal of not only acting as an invigorating force, both internally (within |

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| | | NÖKU Group) and externally (within society), but also to give significant impulses and set new directions on the level of content. In close cooperation with the state of Lower Austria and its Department of Art and Culture, NÖKU Group continually strives to develop and present artistic or scientific projects of thematic and social relevance with a cross-regional or international reach. Committed to highest quality standards, it increasingly also aims to enable genuine artistic work — and thus, starting from Lower Austria, influence the cultural and social landscape of Central Europe. |
|---|---|---|
| Stift Göttweig | Company | The art collections of Göttweig Abbey are of national importance: Abbey library with manuscripts and incunabula collection, graphic collection, abbey archive, music archive with autograph and instrument collection, numismatic collection, picture gallery, church treasury and much more. |
| Museums Management Niederösterreich | Company | The Museumsmanagement Niederösterreich GmbH, the Museum Management of Lower Austria, is a non-profit cultural society that manages the museums, collections, memorials, exhibition houses and themed trails in Lower Austria. It is a 100% subsidiary of Kultur.Region.Niederösterreich GmbH (in German). Its task portfolio developed out of the concerns of the umbrella organisation of museums and collections in Lower Austria, the Association of Museums and Collections of Lower Austria, founded in 1990 and the cultural objectives of the State of Lower Austria (in German). With our work and high practice-oriented professional standards we want to contribute to the positive development of the museum facilities in Lower Austria. |
| Sammlung Essl | Company | The Essl Collection is the most important collection of Austrian art after 1945 and one of the most important collections of contemporary art in Europe. Austrian art is available in an incomparable breadth and depth and, due to the international orientation of the collection, is embedded in an international context that makes currents and cross-connections in the art scene comprehensible.<br>The collection was built up by Agnes and Karlheinz Essl, who have dedicated their lives to art. You intensively accompanied the main Austrian artists of the post-war period as well as numerous international artists on their artistic careers and on their life paths. The Essl Collection, which has grown naturally over almost 50 years, is now an invaluable cultural heritage of Austrian art since the end of the Second World War. |
| Museum Gugging | Company | Museum Gugging is an exhibition venue for the presentation of the work of the Gugging Artists at its place of origin, while serving as a forum for international Art Brut at the same time. With its special focus, museum Gugging has a unique position in Austria's museum sector and is one of the most important exhibition houses for Art Brut in the world. The museum aims for the highest level of quality and measures its endeavours against international exhibition standards. Visitor hospitality, service orientation, accessibility, and multilingualism are natural parts of our house's culture. Museum Gugging builds upon Jean Dubuffet's concept of Art Brut and places it in an open scientific discourse. Dubuffet defined Art Brut as "raw" art; it is created spontaneously, unbiased, anti-intellectual, and free from popular trends. Since the 1970s the Gugging Artists have counted amongst the most important exponents of Art Brut. Jean Dubuffet personally recognised them as representatives of this art movement. The objective of museum Gugging is to present the works of the Gugging Artists and to establish Art Brut as an international art movement. The exhibitions |

| | | are compiled by the artistic director in cooperation with renowned Austrian and international curators. Museum Gugging puts strong emphasis on contemporary and open art education and warmly welcomes its young audience. |
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| Europa Nostra Austria | Non-profit organisation | EUROPA NOSTRA Austria is committed to securing, preserving, researching and communicating the cultural and natural heritage in Austria and promotes the preservation of the cultural and historical heritage as a means of identification within European culture. |
| Museums for Future | Non-profit organisation | To mobilise a global network of museum workers and institutions to participate in coordinated actions that put pressure on decision-makers to enact the Paris Climate Agreement. To foster dialogue between museums, local communities, and the public about the ecological crisis and the diverse solutions to avert it. By emphasising the societal benefits of a sustainable transformation to activate and inspire. |
| ICOMOS Austria | Organisation | ICOMOS Austria unites all persons who declared themselves to be part of the National Committee Austria at ICOMOS International. The task for its members is to participate in the creation and further development of internationally valid recommendations and guidelines in so-called Scientific Committees and in the Advisory Board of ICOMOS International, as well as to implement these international resolutions at national level and through meaningful, transnational cooperation in the region. |
| Kultur.Region.Niederösterr eich Privatstiftung | Foundation | The non-profit Kultur.Region.Niederösterreich private foundation aims at scientifically based and contemporary folk culture and regional cultural work in the area of tension between tradition and innovation. The Kultur.Region.Niederösterreich private foundation also maintains and promotes cross-border cooperation between the European regions in the field of folk culture and regional cultural work. In order to achieve its purpose, the Kultur.Region.Niederösterreich private foundation is the sole shareholder of the Kultur.Region.Niederösterreich GmbH. The aim of the foundation is to ensure success in the field of folk culture and regional cultural work for the future. |
| Museum booster | Research institute | MUSEUM BOOSTER is a Vienna-based research & consultancy company with a focus on the influence of new media technologies on museums and cultural institutions. The mission of MUSEUM BOOSTER is to help museum managers and experts in the cultural field to select, evaluate and implement emerging technologies. In particular, the focus is on tools and ideas which have a positive effect on museums and can create a strategic advantage. |
| European Research Centre for Book and Paper Conservation-Restoration | Research institute | The European Research Centre for Book and Paper Conservation-Restoration was founded in March 2010. It was created on the initiative of the community of conservator-restorers, archivists, librarians and other professionals all over Europe, who saw an urgent need to foster research in book and paper conservation to be able to rescue the graphical and written heritage more efficiently. |
| University for Continuing Education Krems (formerly | Research institute | Natural catastrophes, climate change and human-made disasters endanger not only our lives, but also cause damages to cultural properties or even lead to the permanent loss of cultural heritage. Therefore, the safeguarding and |

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| known as Danube Univerisity Krems) / Center for Cultural Property Protection | | protection of cultural goods require efficient management and appropriate protection measures. Strategies to prevent risks, mitigate damages and to reduce adverse impacts after disasters are of utmost importance.The Convention for the Protection of Cultural Property in the Event of Armed Conflict (The Hague 1954) and its two Protocols constitute the legal framework to prevent or mitigate adverse impacts on the cultural heritage. However, these instruments, being recognised as fundamental part of public international law, are not only applicable during armed conflicts, but set already widely accepted standards for the protection of cultural property during peacetime. |
| Albertina | Museum | The ALBERTINA is one of the leading art museums in Austria. It has one of the largest and most valuable graphic art collections in the world with around 50,000 drawings and around 900,000 prints from all eras and styles. These include world-famous works by Dürer, Raffael, Leonardo, Michelangelo, Rembrandt, Rubens, Biedermeier, Art Nouveau and Expressionist works. |
| Belvedere | Museum | The Belvedere is a World Heritage Site, a Baroque jewel, and the site of the Austrian State Treaty. It is both one of the oldest museums in the world and a venue for contemporary art. As one of the largest cultural institutions in the country and an Austrian landmark, we are faced with the challenge of evolving amidst the differing priorities of cultural and scientific demands, loyalty to the local community and tourism. While we follow our mission to preserve the past, we also seek to break new ground. We stand as a mediator of history and as an inconvenient interrogator of the present. We are the country's cultural hub of international standing, and exist in the transnational digital space. |
| 21er Haus | Museum | Part of the Belvedere complex and venue for contemporary Austrian and international art, film, and music. Architectural icon of post-war Modernism. |
| Kunsthistorisches Museum | Museum | The Kunsthistorisches Museum Wien is one of the foremost museums in the world, with rich holdings comprising artworks from seven millennia - from Ancient Egypt to the late 18th century. The collections of Renaissance and Baroque art are of particular importance. |
| Kaiserliche Schatzkammer Wien | Museum | A unique panorama covering over a millennium of European history. This is the home of the most important collection of mediaeval royal objects: the insignia and jewels of the Holy Roman Empire, including the Imperial Crown and the Holy Lance. Further highlights include the Crown of Emperor Rudolf II. (which later on became Crown of the Austrian Empire), as well as the vestments and other precious items of the Order of the Golden Fleece. Exceedingly valuable gems, including one of the world's largest emeralds, bear witness to the Habsburgs' former degree of power. In earlier centuries, two items were considered to be so unique that they were declared "inalienable heirlooms of the House of Austria": a giant narwhal tooth which was thought to be the horn of a unicorn and an agate bowl from Late Antiquity which was thought to be the legendary Holy Grail. |
| Kaiserliche Wagenburg Wien | Museum | The remnants of the vehicle fleet of the Royal-Viennese court, which originally comprised more than 600 vehicles, are kept in the Wagenburg: in addition to the large stately carriages with which the ruler demonstrated his power, there |

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| | | were "personal" carriages for the imperial family, service vehicles for court employees, and trucks for the transport of goods as well as travel, sports, leisure and children's vehicles. |
| Schloss Ambras Innsbruck | Museum | Ambras Castle Innsbruck is the only location of the KHM Museum Association outside of Vienna and is one of the most important sights in Austria. As the first museum in the world, it is formative for the cultural heritage of Europe. It is a lively museum meeting place for the Innsbruck and Tyrolean population as well as a top visitor experience for international guests. |
| Theatermuseum Österreich | Museum | The Theatermuseum brings together collections on all topics of the performing arts and is one of the biggest and most important documentation centres of its kind in the world. Objects of contemporary Austrian and international stage art from spoken and musical theatre, dance and film to figurine and puppet theatre are kept in the archives and are scientifically researched, published and presented in exhibitions. Our aim is differentiated in-depth research and the attractive presentation of various topics and correlations. A permanent show, ploughing through the centuries of theatre history, does not exist at the moment. |
| Weltmuseum Wien | Museum | Exhibitions provide ethnological museums with an opportunity to display their collections to the general public. The treasures they preserve are dedicated to the better understanding of individual cultures or regions of the world, or offer a comparative approach to the entire spectrum of cultural diversity.<br>In their examination of cultural differences and that which all people have in common, ethnological museums render an important contribution to the understanding of a world that has become much smaller due to the improved possibilities of mobility and communication, and at the same time increasingly multicultural due to migration. It is our task to contextualise social changes and developments in today's world by means of our extensive collections. |
| MAK - Österreichisches Museum für angewandte Kunst | Museum | In a way that is virtually unparalleled by any other institution, the MAK – Museum of Applied Arts stands for the fruitful combination of the past with the future, something which can be clearly sensed and experienced when visiting its extensive collection, large exhibition halls, themed special exhibitions and discourse-centred program of events. Bringing together applied arts, design, architecture, and contemporary art is one of the museum's core competencies. |
| Museums Quartier Wien | Museum | The MuseumsQuartier is a platform for cutting-edge artistic creation, new discourses, and the exchange of ideas.<br>Cultural workers, creative entrepreneurs, artists, the Viennese public, visitors from all over the world: the MuseumsQuartier is used by a whole host of different people. They all make the MuseumsQuartier what it is today – a pulsating, cosmopolitan, and forward-looking cultural district with a feel-good factor.<br>The MuseumsQuartier is a place of encounter. The site is open around the clock and entry is free; there are no gates and no barriers. The world-famous MQ furniture in the courtyards invites visitors to hang out, relax, and chat. And the many cafés and restaurants offer a wide range of culinary options<br>This means that the MQ creates opportunities for dialogue between the Viennese public, international guests, artists, and many others. The people who come together here create a climate of cosmopolitanism and creativity. The MuseumsQuartier Wien is an art space, a creative space, and a living space. |

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| Mumok | Museum | One of the most important objectives has been and continues to be to convey the historical and theoretical framework of art to the public through fostering discourse in the form of publications and academic events. Mumok sees itself as a place for lively exploration of modern and contemporary art. This is art that gets involved and points out the ruptures and transformations in our society, that undermines tried and tested rituals, that makes us more sensitive and expands our imagination, that facilitates new ways of seeing. |
|---|---|---|
| Naturhistorisches Museum | Museum | The Natural History Museum Vienna preserves, expands, researches and presents its extensive collections covering biology, earth sciences, anthropology and archaeology in a building designed as a total work of art. It conveys the diversity of nature, the evolution of Planet Earth and life, and the related cultural development of humankind. Furthermore, it serves as an inspirational meeting place for dialogue and exchange of ideas between the scientific community and the general public. |
| Technisches Museum Wien | Museum | As Austria's largest museum of science and technology, we see ourselves as a place of learning and discourse within society that bridges the realms of science, education, economy and society. Our work is guided by the notion of "sustainability" in an effort to act in a future-oriented and socially effective manner. By way of a framework definition, we are guided by the Sustainable Development Goals (SDGs for short) adopted by the United Nations (UN). These goals represent a globally recommended agenda for sustainable development by 2030, in which 17 goals with ecological, economic and social fields of action have been defined. |
| Österreichisches Nationalbibilothek | Historical Archive | The Austrian National Library preserves as the central scientific library of Austria's intellectual and cultural heritage. With their collections, the outstanding works of World Heritage and European culture, it is one of the most important libraries worldwide. It therefore sees itself as a bridge between the rich Heritage of the past and the demands of modern information and knowledge society. |
| Institut für Kulturkonzepte | Training centre | The team and the lecturers of the Institute for Cultural Concepts have been supporting people in achieving their individual career plans for over 25 years. Our professional ethos is based on the willingness to cooperate and on formulating an attitude towards socio-political and cultural-political challenges. As a privately run and independent institute, we strive to live this ourselves. |
| IKM - Institute of Culture Management and Culture Studies | University | We offer courses at bachelor's and master's degree levels and enable dissertation projects within the framework of PhD studies as part of our commitment to promoting young talent. In addition, with our two postgraduate programs—one for cultural management, the other for applied dramaturgy—we offer two university continuing-education courses with a master's degree, which can be completed part-time, so that theory and practice mutually enrich each other. |

## 6.    An overview on EU funded projects on RMCH

At the European level, the importance of multidisciplinary research in the cultural heritage field is recognised by both the Council of Europe (CoE) and the European Union (EU) institutions. In particular, the Recommendation of the Committee of Ministers of the CoE to member States on the European Cultural Heritage Strategy for the 21st century stresses the importance of multidisciplinary research programmes at national and European levels that reflect the needs of the heritage sector, including the need of sustainable transmission of heritage to future generations (Recommendation K9).

Within the EU wide research and innovation programmes, the EU has supported a number of projects regarding Cultural Heritage, its protection from the impacts of climate change and the value of cultural heritage as a resource for sustainable growth. The reviewed research and innovation projects on cultural heritage are listed in Table 20.

### Horizon 2020/Horizon Europe framework

Under the Horizon 2020/Horizon Europe programme there are projects on cultural heritage preservation and protection, in particular from the climate impacts and hazards associated with climate change, relative to the design and validation of management framework and innovative methods and tools for risk prevention and mitigation. Most of the management framework include community-based approach and citizen science techniques in order to raise awareness on cultural heritage risks and promote sustainable behaviours by the use of Information and Communication Technologies (ICT) and the adoption of common procedures and guidelines.

STORM (Safeguarding cultural heritage through Technical and Organisational Resources Management), closed in 2019, proposed an innovative management framework based on predictive models and non-invasive and non-destructive methods of survey and diagnosis for the prediction of environmental changes and threats that could damage cultural heritage. Predictive models were developed with an integrated system of remote sensors, legacy systems and existing platforms and also with crowdsourcing techniques. ARCH (Advancing Resilience of Historic Areas against Climate-related and other Hazards), closed in 2022, has developed a disaster risk management framework for assessing the resilience of historic areas to climate change and natural hazards through tools and methodologies designed with the integration of citizens and stakeholders

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engagement techniques. HYPERION is an ongoing project (cosing scheduled for November 2022) aimed at contributing to the rehabilitation of the historical regions under threat by providing tools to understand the effects of climate change and extreme weather conditions on monuments. SHELTER (Sustainable Historic Environments hoListic reconstruction through Technological Enhancement and community-based Resilience), ongoing project, proposes the development of a data-driven knowledge framework for the understanding and assessment of climate change impacts on areas of historical and cultural interest and for supporting community-based models of governance. TECTONIC (TEchnological Consortium TO develop sustaiNabIlity of underwater Cultural heritage), ongoing project, is focused on development of decision support tools for preservation and conservation of underwater cultural heritage and development of protocols and suitable procedures for raising awareness and knowledge related underwater historical and archaeological heritage and risk related to changing environment. YADES (Improved Resilience and Sustainable Reconstruction of Cultural Heritage Areas to cope with Climate Change and Other Hazards based on Innovative Algorithms and Modelling Tools), ongoing project, introduce a research framework through the application of atmospheric modelling for specific climate change scenarios for an accurate quantitative and qualitative impact assessment of the estimated micro-climatic and atmospheric stressors to cultural heritage. HERCULES (Sustainable futures for Europe's HERitage in CULtural landscapES: Tools for understanding, managing, and protecting landscape functions and values), closed in 2016, developed innovative technologies and tools for assessing and mapping cultural landscapes to support protection, management and planning of sustainable landscape of significant historical and cultural value at local and European scale by striving the empowerment of local stakeholders and citizens community-based approaches.

PERPETUATE (Performance-based approach to the earthquake protection of cultural heritage in European and Mediterranean countries), closed in 2012, has developed European Guidelines for evaluation and mitigation of seismic risk to cultural heritage by improving innovative techniques for the strengthening of historical buildings and preservation of artworks. CARISMAND (Culture And RISkmanagement in Man-made And Natural Disasters), closed in 2018, applied stakeholders and citizen engagement techniques to improve awareness and knowledge related to risks pending on cultural heritage due to natural hazards and anthropic action.

Other projects under Horizon 2020/Horizon Europe Programme are focused on the development of solutions for services digitalization for the maintenance and management of cultural heritage.

4CH (Competence Centre for the Conservation of Cultural Heritage), ongoing project, is developing digital services (ICT and virtual platforms) for improving competences for the conservation of cultural heritage in terms of standard definitions and access to information exchange, training, education, guidance on policies and strategies related to the enhancement of cultural heritage. IPERION HS (Integrating Platforms for the European Research Infrastructure ON Heritage Science), is another ongoing project focused on development of integrated platforms for supporting interdisciplinary and international research on archeological heritage and the exchange of methods, tools and good practices. CHICC (Culture, Heritage and Identities: Impacts of Climate Change in North West Europe), is an ongoing project aimed at developing digital solutions to examine the damage or loss of cultural property and sites due to climate change. Citizen science techniques are adopted to engage local communities in detecting risks and damages on local cultural heritage. NETCHER (NETwork and digital platform for Cultural Heritage Enhancing and Rebuilding), closed in 2021, was aimed at cataloguing best practices and building joint action and research plans to protect cultural heritage. By developing a digital social platform, the project has drawn an infrastructure to promote participative approach and partnership on research and innovation in management and protection of cultural heritage.

Other projects are oriented on the development of sustainable governance and business models according to a circular economy logic for the protection and enhancement of cultural heritage.

HERACLES (HEritage Resilience Against CLimate Events on Site), closed in 2019, was aimed at developing responsive systems and solutions for enhancement of resilience of cultural heritage against climate change effects. A multidisciplinary approach through the involvement of different expertise (end-users, industry/SMEs, scientists, conservators/restorators and social experts, decision, and policy makers) was at the base of the design and validation of methodologies for the definition of operational procedures for risk mitigation and management. CLIC (Circular models Leveraging Investments in Cultural heritage adaptive reuse), closed in 2021, was oriented to identify evaluation tools and share innovative circular financing, business and governance models for systemic adaptive reuse of cultural heritage and landscape, demonstrating the economic, social, environmental convenience, in terms of long lasting economic, cultural and environmental wealth. PERICLES (PrEseRvIng and sustainably governing Cultural heritage and Landscapes in European coastal and maritime regionS), closed in 2021, was focused on promote sustainable governance of cultural heritage by developing a multi-actor participatory framework in order to develop practical tools, provide policies and knowledge exchange in maritime cultural heritage. SUSTAINING HERITAGE (Sustaining Europe's cultural heritage: from research to

policy), closed in 2005, was oriented towards the definition of policies to integrate the concept of sustainability in the protection and maintenance of cultural heritage, as a unique and non-reproducible and at the same time tangible resource for society. ROCK (Regeneration and Optimisation of Cultural heritage in creative and Knowledge cities), closed in 2020, was aimed at designing and developing a circular systemic approach for the regeneration and adaptive reuse of historic city centres. The project provides a replicable model for regeneration of historic urban centres through the definition of common protocols and implementation guidelines.

Additional projects not strictly related to cultural heritage may however be useful for the purposes related to the mitigation and prevention of risks in the urban environment (disaster risk reduction), the effects and implications of which may be useful in the management of cultural heritage.

RESCCUE (RESilience to cope with Climate Change in Urban arEas - a multisectoral approach focusing on water), closed in 2020, was aimed to deliver a framework enabling city resilience assessment, planning and management by integrating into software tools new knowledge related to the detailed water-centred modelling of strategic urban services performance into a comprehensive resilience platform. RESIN (Climate Resilient Cities and Infrastructures), closed in 2018, had the objective to provide standardised methodologies for vulnerability assessment, performance evaluations of adaptation measures, and for decision support tools supporting the development of robust adaptation strategies tailored to urban contexts. CUIDAR (Cultures of Disaster Resilience among children and young people), closed in 2018, aimed at raising awareness of the younger generations as tools for dealing with disaster risk management through the culture of sustainability. EDUCEN (European Disasters in Urban centres: a Culture Expert Network), closed in 2017, was a project aimed at the definition of common good practise in order to improve citizens knowledge, public awareness and support disaster risk reduction through multi-stakeholder dialogue to prepare people to face environmental risks. LINKS (Strengthening links between technologies and society for European disaster resilience), is an ongoing project which investigates the role of social media and crowdsourcing in the perception and management of natural risks and environmental disasters. The LINKS Framework consists of scientific methods, practical tools, and guidelines addressing researchers, practitioners and policy makers. I-REACT (Improving Resilience to Emergencies through Advanced Cyber Technologies), closed in 2019, was aimed at developing a unique platform to integrate natural disasters analysis and anticipation services for the use of public administration authorities, private companies, as well as citizens. I-REACT systems was designed and developed to

enable early planning of disaster risk action, achieve effective preparedness through early warnings and risk assessment.

## Framework Programmes before Horizon

Risk management in cultural heritage has also found space in the context of other projects funded by the European Union prior to the Horizon program. Within the Fifth RTD Framework Program (1998-2002) two projects were particularly relevant:

- **LIDO**, aimed at developing and testing light dosimeters for application in museums.
- **MULTI**-ASSESS, focused on studying multi-pollutant effects on deterioration and soiling of cultural heritage objects assessed with the aim to propose threshold levels for areas deserving special protection to be included in future EU Directives on urban air quality.

Both projects focused on solutions to monitor deterioration agents in museums and for cultural heritage in relation to air quality in urban environments and in internal spaces.

Regarding **Framework Programme (FP) 6** (2002-2006), there are projects that broaden the field of action and expertise on the protection of cultural heritage related to the policies on the prevention of damage and environmental risks (flood risk) and the digitization of services. Projects focused on policies include **CHEF** (Cultural heritage protection against Flood), that proposed the integration of multidisciplinary research as scientific support to European policies in the field of cultural heritage protection against floods. **CULT-STRAT** (Assessment of Air Pollution Effects on Cultural Heritage - Management Strategies) established scientific references for developing strategies for policy and decision-makers on European and national levels and for heritage managers. **SALTCONTROL** (Prevention of salt damage to the built cultural heritage by the use of crystallisation inhibitors), aimed at developing a new method for the prevention of salt damage on building cultural heritage. Regarding services digitalization for management of cultural heritage FP6 include **CALIMERA** (Cultural applications: Local institutions mediating electronic resource access), aimed at development of innovative technologies and strategies to offer services related to cultural heritage (public libraries, museums and archives) accessible to citizens; DPE (Digital Preservation Europe) focused on security and access to digital cultural and scientific resources.

Finally, as part of **FP7 - Environment Programme** (2007-2013), projects related to nanotechnologies, risk assessment, economic impacts and mitigation strategies for pending risks on cultural heritage were developed. From FP7 it is possible to note an expansion of issues relating to the management and protection of cultural

heritage towards the interdisciplinary approaches evident in Horizon Programme. Climate for Culture proposed a damage risk assessment, evaluation of economic impact and mitigation strategies for sustainable preservation of cultural heritage in climate change context. EU CHIC (European Cultural Heritage Identity Card) promoted a systematic collection and storage of data on the immovable heritage objects across European and neighbouring countries to develop and test the guidelines needed for the efficient compilation of the data pertinent to each monument under observation. FIRESENSE (Fire Detection and Management through a Multi-Sensor Network for the Protection of Cultural Heritage Areas from the Risk of Fire and Extreme Weather Conditions) aimed to develop an automatic early warning system to remotely monitor areas of archaeological and cultural interest from the risk of fire and extreme weather conditions. RISC-KIT (Resilience-Increasing Strategies for Coasts – toolKIT) delivered ready-to-use methods, tools and management approaches to reduce risk and increase resilience to low-frequency, high-impact hydro-meteorological events. SYDDARTA (System for Digitisation and Diagnosis in ART Applications) developed a pre-industrial prototype for diagnosing the deterioration of movable assets by the acquisition of 3D-hyperspectral imaging through scanning non-destructive techniques. Finally, TeACH (Technologies and tools to prioritise Assessment and diagnosis of air pollution impact on immovable and movable Cultural Heritage) designed tools to prioritise Assessment and diagnosis of air pollution impact on immovable and movable cultural heritage.

## Other European Union funded projects

Among other European Union funded projects it is also possible to annoverate Interreg CE, Erasmus + and Creative Europe. Cultural Heritage is also included in Joint Programming Initiatives (JPIs) as a new challenge for Europe in the context of global change.

Among INTERREG Programme on risk management on cultural heritage there is the ProteCHt2save project that contributed to an improvement of capacities of the public and private sectors to mitigate the impacts of climate change and natural hazards on cultural heritage sites, structures and artefacts. STRENCH (STRENgthening resilience of Cultural Heritage at risk in a changing environment through proactive transnational cooperation) that aimed at improving capacities of the public and private sectors to mitigate the impacts of climate change and natural hazards on cultural heritage sites through the application of ready-to-use solutions (WebGIS tool, hazard maps, methodology for vulnerability ranking, strategies for disaster risk reduction) for assessing climate change effects in order to define strategies for the protection of cultural heritage at risk, assisting local

stakeholders in improving their know-how on the process of definition of priorities of intervention and strategies (preparedness/emergency/recovery).

Other projects in the INTERREG framework have instead focused on the enhancement and social re-functionalization of sites and historic centres in a state of decay and abandonment.

The **BhENEFIT** (Built heritage, Energy, aNd, Environmental Friendly Integrated Tools) project focused on improving the management of historic built areas, combining the daily maintenance of historic heritage with its preservation and valorisation in a sustainable way. The project found innovative solutions on how to evaluate the use and historical value of built areas and how to optimise building performances (its energy efficiency and structural behavioural increase). **HICAPS** developed a set of guidelines to revitalise castle parks as places for social interactions and cultural activities. **RUINS** aimed at revitalising mediaeval ruins across Europe through modern management and attributing contemporary, socially useful functions, while preserving the historical value of these sites by means of specific guidelines and integrated replicable models.

Other projects, on the other hand, have focused their attention on the development of strategies for the mitigation of risk management and climate change, albeit without direct connections with cultural heritage. **I-STORMS** (Integrated Sea sTORm Management Strategies) enhanced transnational cooperation sharing knowledge, data and forecasts through a common infrastructure, joint strategies to deal with sea storm emergencies, improving at the same time countries' capacities on data interoperability, early warning & civil protection procedures, in alignment with the EU Civil Protection Mechanism.

Cultural heritage is also a central theme within the Joint Program Initiative (JPI). Methods and techniques for risk mitigation in the management of cultural heritage can be found in **ChT2** (Cultural Heritage Through Time) that was aimed at defining sustainable strategies for protecting and managing cultural heritage. **EMERISDA** (Effectiveness of Methods against Rising Damp in Buildings) provided a scientifically based evaluation of different methods against rising damp and support for successful use of these methods in the practice of conservation. Finally, **PROTHEGO** provided a remote sensing tool and a methodological approach for the safety management of cultural heritage, at low cost and covering monuments and sites located in Europe.

Additional significant and relevant examples on RMCH come from other European design programs such as Erasmus +. Within Erasmus +, **CHARTER** project focused on Cooperation for innovation and the exchange of good practices, Sector Skills Alliances for implementing a new strategic approach ("Blueprint") to sectoral cooperation on skills. It strives towards making apparent the value of cultural

heritage and creating a resilient and responsive sector, working towards creating a lasting, comprehensive strategy that will guarantee Europe has the necessary cultural heritage skills to support sustainable societies and economies.

Table 20 - List of reviewed EU funded project on risk management in cultural heritage

| Programme | Name | Countries | Start year | End year |
|---|---|---|---|---|
| FP5 | LIDO | Germany France Italy United Kingdom Czechia | 2001 | 2004 |
| FP6 | SUSTAINING HERITAGE | United Kingdom | 2004 | 2005 |
| FP6 | CALIMERA (Cultural applications: Local institutions mediating electronic resource access) | Portugal Denmark France Armenia Moldova Romania Spain Serbia Poland Austria Italy Greece Ireland United Kingdom Netherlands Finland Luxembourg Czechia Iceland Latvia Russia Cyprus Bosnia and Herzegovina Slovenia Hungary Sweden Norway Slovakia Ukraine Belgium Germany Croatia Belarus Albania Turkey Bulgaria Lithuania Estonia | 2003 | 2005 |
| FP5 | MULTI-ASSESS | Sweden Austria Czechia Germany Greece Italy Norway Poland Switzerland United Kingdom | 2002 | 2005 |
| FP6 | CULT-STRAT Assessment of Air Pollution Effects on Cultural Heritage - Management Strategies | Sweden Czechia Germany Italy Norway Spain United Kingdom | 2004 | 2007 |
| FP6 | SALTCONTROL Prevention of salt damage to the built cultural heritage by the use of crystallisation inhibitors | Ireland Serbia United Kingdom Germany Czechia Italy France Netherlands | 2004 | 2007 |
| FP6 | DPE Digital Preservation Europe | United Kingdom Czechia Germany Denmark Italy Netherlands Lithuania | 2006 | 2009 |
| FP6 | CHEF Cultural heritage protection against Flood | Germany Austria Italy Romania Slovenia United Kingdom | 2007 | 2010 |
| FP7 | PERPETUATE Performance-based approach to the earthquake protection of cultural heritage in European and Mediterranean countries | Italy, France, Greece, Slovenia, UK, Algeria | 2010 | 2012 |
| FP7 | EU CHIC European Cultural Heritage Identity Card | Slovenia, Austria, Belgium, Croatia, Czechia, Germany, Greece, Israel, Italy, Poland, Spain | 2009 | 2012 |
| FP7 | TeACH Technologies and tools to prioritize Assessment and diagnosis of air pollution impact on immovable and movable Cultural Heritage | Italy Belgium Germany Norway Poland Spain United Kingdom | 2008 | 2012 |

| FP7 | FIRESENSE Fire Detection and Management through a Multi-Sensor Network for the Protection of Cultural Heritage Areas from the Risk of Fire and Extreme Weather Conditions | Greece Belgium Italy Netherlands Tunisia Turkey | 2009 | 2013 |
|---|---|---|---|---|
| FP7 | Climate for Culture | Spain Belgium Germany Greece Italy Netherlands Portugal Slovenia United Kingdom | 2009 | 2014 |
| FP7 | SYDDARTA System for Digitisation and Diagnosis in ART Applications | Spain Belgium Germany Greece Italy Netherlands Portugal Slovenia United Kingdom | 2011 | 2014 |
| FP7 | HERCULES - Sustainable Futures for Europe's Heritage in Cultural Landscapes | Germany, Denmark, France, Belgium, UK, Slovenia, Netherlands, Estonia, Greece, Switzerland, Sweden | 2013 | 2016 |
| Horizon 2020 | EDUCEN European Disasters in Urban centres: a Culture Expert Network (3C – Cities, Cultures, Catastrophes) | Netherlands, Spain, Italy, Poland, Sweden, Greece, Turkey | 2015 | 2017 |
| JPI | EMERISDA Effectiveness of Methods against Rising Damp in Buildings | Italy Belgium Cyprus France Ireland Netherlands Poland Romania Spain United Kingdom | 2014 | 2017 |
| FP7 | RISC-KIT Resilience-Increasing Strategies for Coasts – toolKIT | Netherlands Belgium Bulgaria France Germany Italy Portugal Spain Sweden Switzerland United Kingdom | 2013 | 2017 |
| Horizon 2020 | CARISMAND Culture And RISkmanagement in Man-made And Natural Disasters | Netherlands, Malta, Bulgaria, Italy, Germany, France, Serbia, Portugal, Spain, United Kingdom, Romania | 2015 | 2018 |
| Horizon 2020 | CUIDAR Cultures of Disaster Resilience among children and young people | United Kingdom, Spain, Portugal, Italy, Greece | 2015 | 2018 |
| JPI | ChT2 Cultural Heritage through time | Italy Poland Spain United Kingdom | 2015 | 2018 |
| JPI | PROTHEGO | Italy Cyprus Spain United Kingdom | 2015 | 2018 |
| Horizon 2020 | RESIN Climate Resilient Cities and Infrastructures | Netherlands Austria France Germany Poland Slovakia Spain United Kingdom | 2015 | 2018 |
| Horizon 2020 | HERACLES - HEritage Resilience Against CLimate Events on Site | Italy, France, Germany, Austria, Portugal, Belgium, Greece | 2016 | 2019 |
| Horizon 2020 | STORM - Safeguarding Cultural Heritage through Technical and Organisational Resources Management | Italy, Portugal, Greece, Germany, United Kingdom, Austria, Turkey | 2016 | 2019 |
| Horizon 2020 | I-REACT - Improving Resilience to Emergencies through Advanced Cyber Technologies | Italy Austria Belgium Finland France Germany Norway Serbia Spain United Kingdom | 2016 | 2019 |

| | | | | |
|---|---|---|---|---|
| Horizon 2020 | ROCK - Regeneration and Optimisation of Cultural heritage in creative and Knowledge cities | Italy; Portugal; France; Romania; UK; Spain; North Macedonia; Switzerland; Greece; Lithuania; Netherlands | 2017 | 2020 |
| Interreg Central Europe | ProteCHt2save | Austria, Croatia, Czech Republic, Hungary, Poland, Slovenia, Italy | 2017 | 2020 |
| Interreg Central Europe | RUINS | Croatia Czech Republic Poland Slovakia Slovenia Italy | 2017 | 2020 |
| Interreg Central Europe | HiCAPS | Croatia Poland Slovenia Italy | 2017 | 2020 |
| Interreg Central Europe | BhENEFIT Built heritage, Energy, aNd, Environmental Friendly Integrated Tools | Austria Croatia Czech Republic Hungary Slovakia Slovenia Italy | 2017 | 2020 |
| Interreg | I-STORM Integrated Sea sTORm Management Strategies | Italy Albania Croatia Greece Slovenia | 2018 | 2020 |
| Horizon 2020 | RESCCUE RESilience to cope with Climate Change in Urban arEas | Spain France Kenya Portugal United Kingdom | 2016 | 2020 |
| Horizon 2020 | PERICLES - PrEseRvIng and sustainably governing Cultural heritage and Landscapes in European coastal and maritime regionS | Netherlands, France, United Kingdom, Portugal, Estonia, Greece | 2018 | 2021 |
| Horizon 2020 | CLIC Circular models Leveraging Investments in Cultural heritage adaptive reuse | Italy Austria Belgium Croatia Germany Ireland Netherlands Poland Slovenia Sweden United Kingdom | 2017 | 2021 |
| Horizon 2020 | NETCHER NETwork and digital platform for Cultural Heritage Enhancing and Rebuilding | France Spain Italy Belgium Germany | 2019 | 2021 |
| Horizon 2020 | ARCH - Advancing Resilience of Historic Areas against Climate-related and other Hazards | Germany, Spain, Italy, Ireland, Slovakia, South Korea | 2019 | 2022 |
| Horizon 2020 | HYPERION - Development of a Decision Support System for Improved Resilience & Sustainable Reconstruction of historic areas to cope with Climate Change & Extreme Events based on Novel Sensors and Modelling Tools | Greece, Finland, Norway, Switzerland, Germany, Italy, Spain, Cyprus, | 2019 | 2022 |
| Interreg Central Europe | STRENCH | Austria Croatia Czech Republic Hungary Slovenia Germany Italy | 2020 | 2022 |

| Horizon 2020 | 4CH - Competence Centre for the Conservation of Cultural Heritage | Italy, Spain, Belgium, Bulgaria, Moldova, Netherlands, Greece, Portugal, Cyprus, Ireland, Romania, France, Switzerland | 2021 | 2023 |
|---|---|---|---|---|
| Horizon 2020 | SHELTER - Sustainable Historic Environments hoListic reconstruction through Technological Enhancement and community based Resilience | Spain, Italy, France, Belgium, Czechia, Netherlands, Austria, Turkey, Croatia, United Kingdom | 2019 | 2023 |
| Horizon Europe | CHICC Culture, Heritage and Identities: Impacts of Climate Change in North West Europe | Assessment of Air Pollution Effects on Cultural Heritage - Management StrategiesDenmark | 2020 | 2023 |
| Horizon Europe | IPERION HS Integrating Platforms for the European Research Infrastructure ON Heritage Science | Italy Belgium Brazil Cyprus Czechia Germany Spain France Greece Hungary Israel Malta Mexico Netherlands Norway Poland Portugal Romania Sweden Slovenia United Kingdom | 2020 | 2023 |
| Horizon Europe | LINKS Strengthening links between technologies and society for European disaster resilience | Netherlands Belgium Denmark Germany Italy Luxembourg | 2020 | 2023 |
| Erasmus + | CHARTER | Spain Austria Netherlands Italy Sweden France Ireland Belgium Romania Germany Finland Latvia Slovenia Portugal United Kingdom Greece | 2021 | 2024 |
| Horizon Europe | TECTONIC Technological Consortium to develop sustainability of underwater Cultural Heritage | Italy Croatia Czechia France Greece Spain | 2020 | 2025 |
| Horizon Europe | YADES Improved Resilience and Sustainable Reconstruction of Cultural Heritage Areas to cope with Climate Change and Other Hazards based on Innovative Algorithms and Modelling Tools | Greece Cyprus Finland Italy Lithuania Switzerland | 2020 | 2025 |

# 7. Conclusions

## Main findings

The desk research work reports a rather complex framework relating to risk management in cultural heritage. The variety of perspectives and methodological approaches that emerged in this review induce the figure of the risk manager to interact in a context with a high level of complexity and adaptability determined by the circumstances in which it operates.

The **complexity** of the risk manager role is given, first of all, by the **variety of types of existing cultural heritage**. They vary from the single monument inside museum internal spaces or external urban, to archival material up to including assets represented by cultural landscapes or historical centres. The heritage takes on different forms, physical and morphological characteristics whose accurate knowledge is essential for its management.

Secondly, **cultural heritage** is not a resource in itself but **an integral part of social, economic, identity and territorial systems** that make it a resource that cannot be replicated or reproduced. The **skills of a risk manager must therefore include the dense multidirectional relational networks** that define the reference context of cultural heritage at the local level as well as the directives and regulations and regulations regarding the protection and management of cultural heritage. This last aspect is particularly urgent in the European context where cultural heritage assumes significance and social value also in terms of urban planning and sustainable development in the directives and guidelines related to the Green Deal and in the application of the Sustainable Development Goals set by the UN Agenda 2030.

Another aspect that contributes to the complexity of the risk manager's role is the **variety of natural disasters linked to climate change** that impact on cultural heritage. As seen in the previous sections, the risks can have different origins and characteristics (e.g., flood risk, fire risk, seismic risk). The anthropic action contributes to aggravating the threat picture, the impacts of which are measured in terms of atmospheric and environmental pollution or deliberate acts such as vandalism or fraudulent destruction. The detailed knowledge of all the potential risks that threaten cultural heritage goes far beyond the skills of a risk manager, possible only with scientific and professional sectoral expertise. However, a basic knowledge of environmental and earth sciences would allow a managerial resource to support coordination and direction activities.

## The Risk Manager for Cultural Heritage:
## a professional figure capable of connecting different scientific and technical sectors

Defining the **competences of a risk manager in cultural heritage** led the partners of the CHARISMA project to a confrontation. At the end of this report we can frame the **set of knowledge and skills that a risk manager must have** in general and indicative to be able to manage the pending challenges on cultural heritage in a global context of profound environmental and social changes.
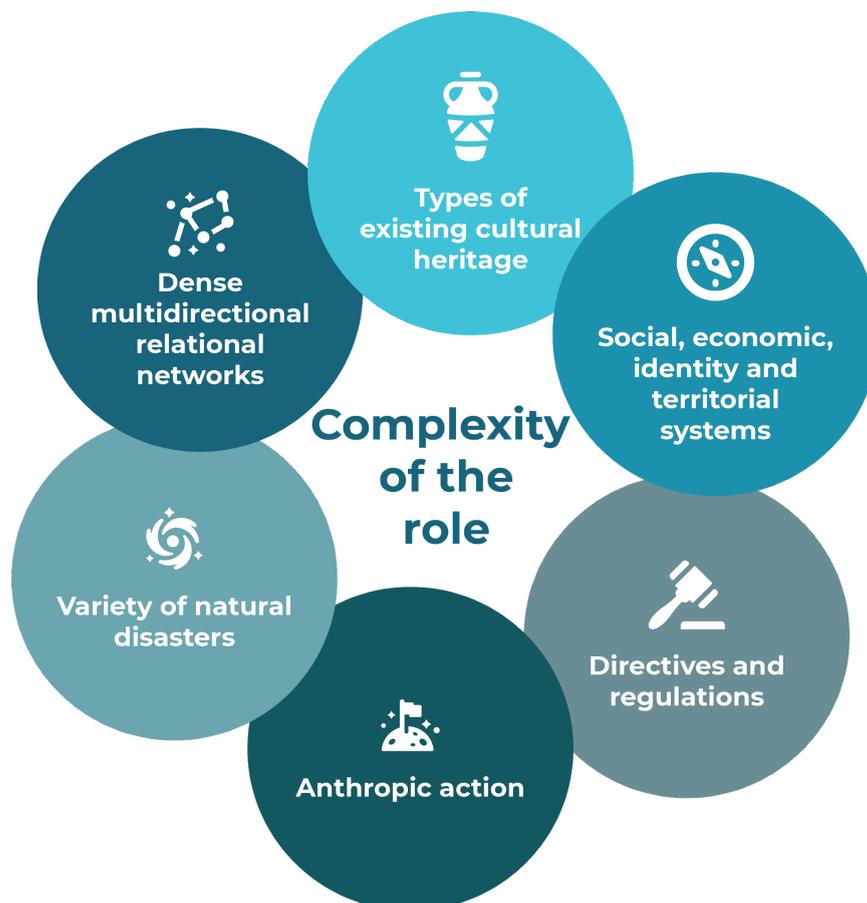


Figure 17 - Complexity of the role of the Risk Manager for Cultural Heritage

Risk managers for cultural heritage (RMCH) should have twofold training.

On the one hand, they should **specialise in scientific and technical studies** on the interactions between the materials constituting the artworks and the forces that might threaten their conservation.

At the same time, they should have an **understanding of art, history, and the management of cultural assets**. These professional figures could bridge the gap

![CHARISMA - Cultural Heritage Academy for Risk Management]

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among different experts in the cultural heritage sector, putting diagnostics and scientific research in close communication with art professionals, historians, and museum curators.

The **main skill** of a risk manager is the **ability to act as an interface between and to foster the cooperation among emergency responders**, cultural heritage experts and owners of cultural heritage as well as the civil society. Generally speaking a skilled risk manager regarding CH protection ideally requires at least a **sound insight regarding all soft and hard skills surrounding the management of the heritage at risk**.



Scientific and technical studies

Management of cultural assets

Understanding of art and history

Exercises on field
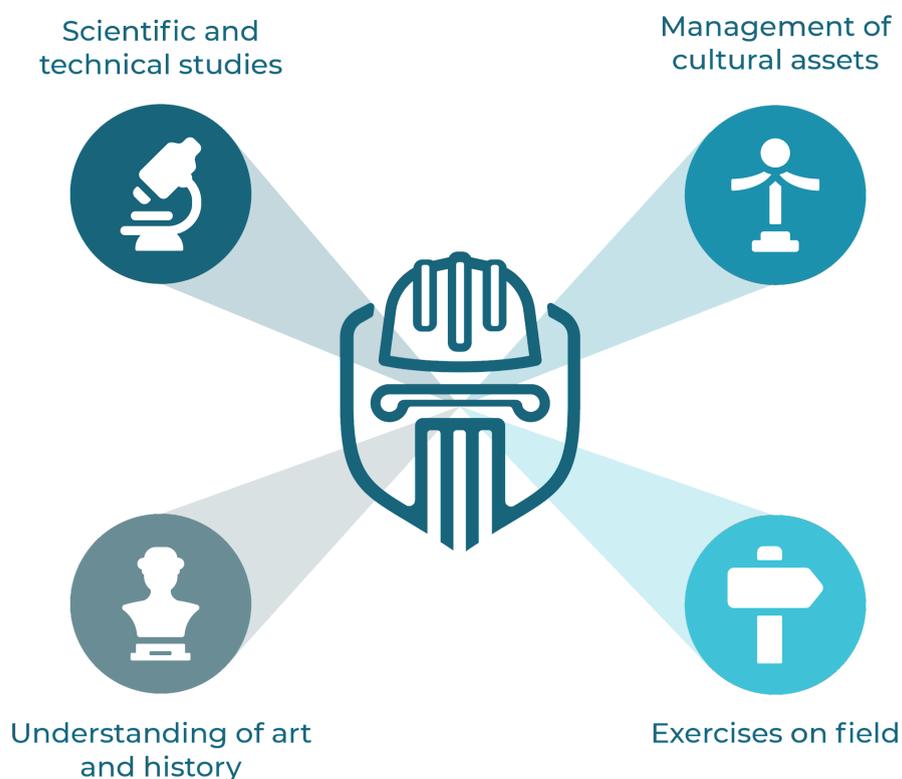
Figure 18 - Set of knowledge of the Risk Manager for Cultural Heritage

When seeking the truly core competency of a risk manager then it would be the ability to act as an interface between the various emergency response units as well as the site-management-entities on each the local, regional, national and ideally international level. Thus the **risk manager must learn the working language of each side and should have a sound understanding of each party's working procedure** and chain of command and/or hierarchy. Further an understanding of each parties competency and aim (in case of an emergency) is important when seeking to harmonise the individual parties actions for achieving the common goal

of protecting the heritage at risk. **A vital measure in order to obtain such skill would be to organise exercises together with these various entities.**

While it is not possible to organise exercises in truly real conditions, it is necessary to systematically organise such exercises in the field of (for example) evacuation of cultural goods in order to improve the work of the involved parties. In this context (following the example) the risk manager should also establish an internal alarm chain and emergency plan, nominate an emergency coordinator, designate places where objects can be evacuated if needed, and (if applicable) prepare material for packing the most important goods and spread awareness and knowledge on the sustainable and cost-effective preparedness measures.

Some of the specific skills that a risk manager in cultural heritage should have in **scientific and technical studies** could be:

- knowing the **major risks deriving from the natural context** surrounding a building and from incorrect environmental conditions;
- having a general knowledge of the **best procedures for the conservation of the materials** that make up the cultural heritage and to be able to evaluate their conservation needs.

Some of the risk manager expertise in the **humanistic field** include:

- having a **general knowledge of the main artistic movements and of art history**, and being able to understand the organisation of cultural assets broadly.

In addition, they should gain specific competencies on technical emergency issues, such as:

- Knowledge on how to operate the main fire safety and intrusion systems;
- Knowledge of the water, electrical and ventilation systems of a building;
- Knowledge of rescue procedures for cultural heritage.

Moreover, they should be informed about the institutions that have to be involved during an emergency in a cultural heritage institution. For the specificity of the role they will play, a risk manager could finally benefit from a bunch of collateral abilities such as **digital skills**, **management and networking skills**, and the ability to communicate and cooperate with other professionals.

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