



**International Council on
Monuments and Sites**
**Conseil International
des Monuments et des Sites**
Deutsches Nationalkomitee e.V.



International Co-Sponsored Meeting on Culture, Heritage and Climate Change, Model project Germany

Report on the Expert Workshop held on 9 July 2021

Content

Report on the Expert Workshop held on 9 July 2021	1
1. Introduction	4
2. Methods	6
2.1. Preparatory meeting	6
2.2. Questionnaire	6
2.3. Evaluation of the questionnaires	13
2.4. Workshop	13
2.5. Publication and project profile	13
2.6. Selection of the experts	13
2.7. Documentation of the discussion	13
3. Workshop results	14
3.1. Summary of the opening lectures	14
3.1.1 Welcome of Constanze Fuhrmann, Head of the Environmental Communication and Cultural Heritage Protection Department of the German Federal Environmental Foundation	14
3.1.2. Welcome of Prof. Dr Jörg Haspel, President of ICOMOS Germany	14
3.1.3. Introduction of Dr. Mechtild Rössler, Director of the UNESCO World Heritage Centre	16
3.1.4. Introduction of Dr Birgitta Ringbeck, Federal Foreign Office	16
3.1.5. Introduction of Dr Thomas Reineke, German Aerospace Center (DLR)	17
3.2. Discussion of the questions in the workshop	18
3.2.1 Question complex 1: Consequences of climate change on cultural and natural heritage and the vulnerability thereof	18
3.2.1.1. Summary of the answers from the questionnaire	18
3.2.1.2. Summary of the group discussions	21
3.2.2. Question complex 2: Protection and adaptation measures against the consequences of climate change on cultural and natural heritage	23
3.2.2.1. Summary of the answers from the questionnaire	23
3.2.2.2. Summary of the group discussions	27
3.2.3. Question complex 3: The role of cultural and natural heritage in climate change mitigation or in minimising the impacts of climate change	27
3.2.3.1. Summary of the answers from the questionnaire	27
3.2.3.2. Summary of the group discussions	30
3.2.4. Question complex 4: Consideration of the impacts of climate change on cultural and natural heritage in policy frameworks	31
3.2.4.1. Summary of the answers from the questionnaire	31
3.2.4.2. Summary of the group discussions	32
3.2.5. Question complex 5: Learning from the past for the future management of cultural and natural heritage	33
3.2.5.1. Summary of the answers from the questionnaire	33
3.2.5.2. Summary of the group discussions	35

3.2.6. Summary of the group discussions overall	35
3.2.7. Summary of the final statement by Dr Johanna Leissner, Fraunhofer Institute for Silicate Research, Fraunhofer EU Office Brussels	36
4. Conclusions.....	37
List of annexes	38
Annex 1: Workshop-Agenda.....	39
Annex 2: Liste of Participants	41
Annex 3: Project- and Publication profiles	42

1. Introduction

Despite the growing political attention, the connection between climate change, culture, and cultural heritage has so far received little attention in the global climate discourse. It is well known that sustainable development should consider culture and cultural heritage from the very beginning. In order to intensify the discussion, an international interdisciplinary group of selected experts is to be recruited for an exchange of experience on the connections and interactions between cultural heritage, monument preservation/restoration, and climate change in order to link culture and cultural heritage more closely with climate issues at the scientific level.

In this context, the first step was to organise an expert workshop in German-speaking countries by the German National Committee of the International Council on Monuments and Sites (ICOMOS) as the advisory organisation of UNESCO on world heritage issues and the German Federal Environmental Foundation (DBU). The event took place on 9 July 2021 and was held online because of the corona pandemic.

The workshop with the associated report is part of the preparations for an international expert meeting on the same topic (the International Co-Sponsored Meeting on Culture, Heritage and Climate Change; ICSM CHC), which will be organised at the end of 2021 in cooperation with the Intergovernmental Panel on Climate Change (IPCC), ICOMOS, and UNESCO. The purpose of the international exchange is to take stock of the current state of knowledge on the links between climate change and cultural heritage. Research gaps on climate impacts on cultural heritage will be identified, and necessary climate protection and adaptation strategies will be identified. The results of the expert meetings should be incorporated into IPCC reporting – possibly in the form of a separate special report on cultural heritage and climate change.

The IPCC–UNESCO–ICOMOS dialogue between climate experts and cultural heritage experts as well as other cultural experts offers an opportunity to intensify the exchange between the climate and environmental protection side and the cultural and cultural heritage side that have long been called for. The fact that both the German meeting and this first meeting of experts from the IPCC with experts from UNESCO and its experts from the International Council on Monuments and Sites (ICOMOS) and the International Union for Conservation of Nature (IUCN) are taking place at all is largely thanks to the technical and financial support of the project of the German Federal Environmental Foundation (DBU). This also includes the intention that those addressed should cover intangible cultural heritage and natural heritage beyond the protection of monuments (and the interrelationships nature-culture) as well as the worldwide total spectrum of tangible and intangible cultural activities, including indigenous peoples as heirs and practitioners of unique cultures.

The expert hearing of 9 July 2021 for the German-speaking region documented here, which was intended to prepare the international expert meeting in December 2021 and to collect questions and expectations for the December meeting, is part of the work package agreed between the DBU and ICOMOS. It thus serves as a model for the regional preparation and follow-up of the international conference of cultural, heritage, and climate scientists. An evaluation and discussion of the conference results from December 2021 are planned by the DBU and ICOMOS Germany for spring 2022. The aim is to reach not only experts but also political decision-makers and the general public in German-speaking countries who are interested in monuments. Cultural heritage concerns must not only be given greater consideration in the international climate agenda but also be addressed and implemented in both the European and national frameworks. The international culture and climate conference sees itself as a catalyst for a greater role that culture and cultural heritage should aspire to in climate science and policy. The reason for planning a preparatory (and follow-up) workshop with experts from German-speaking countries was the desire to involve those responsible in the Federal Republic of Germany more closely in the international climate–

culture debate and also to test a model for the longer-term implementation of issues relating to monument protection and climate change at the national level.

Before the workshop was planned, the questionnaire prepared for the International Co-Sponsored Meeting on Culture, Heritage and Climate Change (ICSM CHC) was made available. It became the basis for exchange among German-speaking experts.

Experts from various institutions for the preservation of architectural and archaeological monuments at the national, state, and municipal level (Federal Foreign Office, monument offices, and municipalities) from Germany, Switzerland, and Austria as well as representatives of climate science from research institutions and the federal government were invited.

After the ICSM CHC in December 2021, a presentation event of the results of the International Co-Sponsored Meeting on Culture, Heritage and Climate Change in early summer 2022 is planned as the second part of the German activities. All experts of the workshop as well as representatives of politics and society and other interested parties are to be invited.

2. Methods

The following methods were used for the preparation and implementation of the workshop:

2.1. Preparatory meeting

The workshop was prepared in online meetings between March 2021 and July 2021 by Dr Marcy Rockman (until July 2021, Co-Chair for ICOMOS in the ICSM CHC), Constanze Fuhrmann (DBU), and Prof. Dr Jörg Haspel (ICOMOS Germany), Dr Dorothee Boesler (ICOMOS Germany) and from May 2021 additionally by Marie Baudis (ICOMOS Germany).

2.2. Questionnaire

Both the preparation and the implementation of the workshop were guided by a questionnaire that was part of the agreement between ICOMOS–UNESCO and the IPCC on the ICSM CHC. The questions were conceptually adapted and translated into German by Constanze Fuhrmann. The translation was intensively discussed by the preparation team and checked by the German Aerospace Center (DLR; Dr Thomas Reinecke and Dr Christiane Textor) with respect to the use of terminology.

Questionnaire:

Expert workshop on 9 July 2021 to support the international meeting of UNESCO–ICOMOS–IPCC¹ on culture, cultural heritage, and climate change in December 2021

¹ UNESCO: United Nations Educational, Scientific and Cultural Organisation
ICOMOS: International Council on Monuments and Sites
IPCC: Intergovernmental Panel on Climate Change

1 Consequences of climate change on cultural and natural heritage and the vulnerability thereof

Questions on the current state of research and practice regarding climatic impacts on cultural and natural heritage in German-speaking countries (including extreme weather events):

- 1.1 How do you assess the current state of knowledge in research and practice about the impacts of climate change on cultural and natural heritage?
- 1.2 Which (research) literature and projects can you name in this context? (For more detailed information, please use the project profile)
- 1.3 On which topics does additional research need to be done?
- 1.4 In your opinion, what is the current state of knowledge in German-speaking countries about the regional influence of climate change?
- 1.5 How do you assess the state of knowledge about the consequences of climate change on natural and cultural heritage under different climate scenarios? Please give examples.
- 1.6 Which cultural and natural heritage sites in German-speaking countries can you name specifically that are already affected by the consequences of climate change? Please give examples.
- 1.7 In your opinion, how high is the proportion of already endangered cultural and natural heritage sites in German-speaking countries in relation to their total number (percentages)?
- 1.8 Which tools, methods, approaches and/or technologies are currently used to assess vulnerability?
- 1.9 What new tools, methods, approaches, and/or technologies do you think are needed to better identify, document, monitor, and analyse vulnerability?

2 Protection and adaptation measures against the consequences of climate change on cultural and natural heritage

- 2.1 What is the state of knowledge about measures to protect and adapt the cultural and natural heritage against the consequences of climate change?
- 2.2 What protection and adaptation measures for the preservation of cultural and natural heritage are applied in your field of work? How successful are these?
- 2.3 In your opinion, what measures are needed in the German-speaking countries in order to increase the resilience and protection of cultural and natural heritage?
- Short-term:
 - Medium-term:
 - Long-term:
- 2.4 What measures are you aware of to adapt to the consequences of climate change on cultural and natural heritage?
- to individual and institutional capacity building
 - to the improvement of the transfer of knowledge
 - to the improvement of technology transfer and delivery
 - to the enabling of financing
 - to the establishment of systems to identify hazards and risks
 - to risk management or to provide information and data on climate change-related risks for timely decision making?
- 2.5 It will probably not be possible to completely protect cultural and natural heritage from the consequences of climate change. What approaches, methods, and/or practices are you aware of for responding to losses that have already occurred or for responding to impending losses?

2.6 Climate protection versus cultural heritage and nature conservation In your opinion, what conflicts exist in practice between the protection of cultural and natural heritage and the necessary transformation towards sustainability?

2.7 What do you think is needed in order to adequately address this potential for conflict?

2.8 Which common standards (have not proven themselves and) should be reconsidered?

3 The role of cultural and natural heritage in climate change mitigation or in minimising the impacts of climate change

On the current state of scientific knowledge of the role and contribution of cultural and natural heritage to societal resilience to the regional consequences of climate change:

- 3.1 What specific contributions do you think cultural and natural heritage can make to societal resilience?
- 3.2 What challenges or obstacles can be identified from your experience in this context?
- 3.3 In your opinion, what role can be attributed to cultural and natural heritage in climate protection, decarbonisation, and adaptation to climate change? What examples already exist here?
- 3.4 What measures exist in your field of work to reduce the negative impacts of climate change on cultural and natural heritage?
 - In theory:
 - In practice:
- 3.5 Cultural and natural heritage provides (physical and/or psychological) shelters in and after disaster or conflict situations.
 - In your opinion, what is the state of current scientific knowledge about the role of cultural and natural heritage in strengthening societal resilience?
 - How can cultural and natural heritage, cultural practices, and related governance models influence individual and collective climate action?
- 3.6 Are there examples in which the embodied energy of cultural heritage was a central argument assessing the sustainability of measures?

4 Consideration of the impacts of climate change on cultural and natural heritage in policy frameworks

- 4.1 To what extent have the impacts of climate change on cultural and natural heritage been taken into account in policy documents/official reporting in the German-speaking countries so far (including concepts such as risk management, vulnerability assessments, impacts, and loss and damage analyses)?
- 4.2 Which gaps do you think are obvious and need to be addressed?
- 4.3 Which policy frameworks, guidelines, and laws linked to the protection of cultural and natural heritage from the impacts of climate change exist in German-speaking countries?
- 4.4 In your opinion, how are these policy frameworks, guidelines, and laws already being implemented in practice in German-speaking countries?
- 4.5 What gaps do you think exist here? And what additional legislative framework is needed?
- 4.6 To what extent are international conventions such as the Paris Climate Agreement and the United Nations 2030 Agenda for Sustainable Development (Goal 11.4) already effectively implemented in cultural and natural heritage protection (e.g. in legislation or in the implementation of the World Heritage Convention) in the German-speaking legal system?

5 Learning from the past for the future management of cultural and natural heritage

- 5.1 What lessons do you think can be learned from dealing with past climate change processes (e.g. concepts of human behaviour)?
- 5.2 What gaps in data and practice do you think still need to be filled?
- 5.3 What are current methods for turning insights from centuries or millennia of human–environment experience into meaningful approaches to climate change research?
- 5.4 Which methods are needed in order to translate insights from centuries or millennia of human-environment experience into meaningful approaches to climate change research and response?

2.3. Evaluation of the questionnaires

The questionnaire was made available to all experts four weeks before the event for preparation. The experts were asked to return the completed questionnaires before the workshop so that their answers could be used to structure the group discussions in the workshop.

2.4. Workshop

After introductory greetings and information from the DBU, ICOMOS, UNESCO, and DLR, the workshop held on 9 July 2021 was essentially conducted online as a group discussion in two breakout rooms. One moderator each led the discussions on Question sets 1 and 2 and 3–5 of the questionnaire.

All participants had the opportunity to comment on each question. However, because of the tight time frame, some questions were prioritised for the group discussion based on the completed questionnaires.

2.5. Publication and project profile

In order to facilitate the scientific work on an envisaged IPCC report on cultural heritage and to integrate German-language research projects more intensively into international research, a publication and project profile was developed. The information from the profiles should also serve to strengthen the German-language contribution of science in the work of the IPCC.

2.6. Selection of the experts

When selecting the experts, an attempt was made to involve all relevant institutions dealing with climate change and cultural heritage in the Federal Republic of Germany as well as in Switzerland and Austria. They should also take on a multiplier role for the topic and/or have a professional interface between climate change and cultural and natural heritage. Invitations were extended to the Association of State Monument Preservators and the Association of State Archaeologists in the Federal Republic of Germany, the Federal Monuments Office in Austria, and research institutes specialising in climate (e.g. Climate Service Center Germany (Gerics) and archaeology as well as experts from ICOMOS who are already working on climate issues.

Most of these invitations were accepted ([see list of participants in the annex](#)).

2.7. Documentation of the discussion

Two methods were used to document the results of the discussions. The respective moderator and other persons took notes during the discussion, and all discussions were also recorded as videos.

3. Workshop results

3.1. Summary of the opening lectures

3.1.1 Welcome of Constanze Fuhrmann, Head of the Environmental Communication and Cultural Heritage Protection Department of the German Federal Environmental Foundation

The German Federal Environmental Foundation (DBU) supports innovative model projects of high environmental relevance. In line with its purpose, the DBU is committed to promoting environmental awareness through networking and building skills. This is particularly true for the protection of cultural assets and has been firmly anchored in the guidelines of the foundation since it was started 30 years ago. Against this background, this project is of particular importance. This is because climate change is having an impact on cultural and natural heritage – sometimes to a serious degree. Innovative approaches are needed to counter anthropogenic environmental change.

The issue is therefore receiving increasing political attention at the international level. Important policy documents such as the UN Sustainable Development Goals or the UN Sendai Framework for Disaster Risk Reduction 2015–2030 emphasise the role of cultural and natural heritage for sustainable development and call for increased conservation efforts. In the global climate discourse, however, the connection between climate change and cultural heritage has so far received little attention. One example of this is the European Green Deal of the EU Commission, which left out relevant areas such as “energy efficiency” and “innovation” cultural heritage. A corresponding contribution was first made through the commitment of cultural heritage organisations with the European Cultural Heritage Green Paper. Similar deficits can also be recognised in international climate science. The IPCC has already included thematic paragraphs on this in its most recent reports. But it requires a comprehensive consideration of the situation.

This is the aim of the present DBU project: For the first time, international cultural (heritage) experts will come together in order to analyse the current state of research and practice on the impacts of climate change on culture as well as cultural and natural heritage and to contribute to IPCC reporting. Against this background, an international meeting of experts and the preparation of topic-specific white papers are planned. But the DBU would also like to promote dialogue more strongly in Germany. The discussion forum for experts from German-speaking countries is an important approach to give the topic greater visibility in society and politics. There is a great need for research and exchange of experience on the interactions between cultural (heritage) and climate change.

3.1.2. Welcome of Prof. Dr Jörg Haspel, President of ICOMOS Germany

Monuments and conservation will neither save the climate nor slow down or even stop climate change. Conversely, the occasionally demanded removal or disfigurement of monuments (e.g. through flood protection or energy improvement measures) is also unlikely to have any influence on global climate scenarios in their overall balance. For climate models and the simulation of possible consequences of global warming, the number of monuments is probably a “quantité négligeable”. Rather, more serious impacts in the opposite direction can be assumed. Climate scenarios sometimes pose a threat to the preservation of monuments. Climate change poses a dramatically increased threat to monuments. In this sense, climate protection also means the protection of monuments. As the ICOMOS General Assembly in New Delhi 2017 put it: “Climate Action is Heritage Conservation”.

The three devastating floods that have hit regions in Germany since 2000 alone have also left a trail of destruction, including total losses and reconstruction measures costing millions of euros for building, gardens, and archaeological sites worth preserving. With events and publications such as “Klimastabilisierung und bauphysikalische Konzepte. Wege zur Nachhaltigkeit bei der Pflege des Weltkulturerbes” (ICOMOS Hefte 2005) or “Cultural Heritage and Disaster” (Heritage at Risk Special, 2007) and “Hochwasserschutz an historischen Orten” (ICOMOS Hefte 2015), ICOMOS Germany has reacted to the conservation challenges of climate change on various occasions, albeit rather sporadically, in recent years.

On a global scale, ICOMOS has addressed recent climate-related threats to cultural heritage by establishing international cross-sectional scientific committees on topics such as energy and sustainability (ISCES: International Committee on Energy and Sustainability), polar heritage (IPHC: International Polar Heritage Committee), and disaster risk reduction (ICORP: International Committee on Risk Preparedness). The establishment of more flexible and temporary ad-hoc working groups such as the Sustainable Development Goals Working Group (SDG WG) and Climate Change and Cultural Heritage Working Group (CCH WG) complements these activities.

However, if you review the relevant ICOMOS policy documents such as the international declarations and recommendations adopted by general assemblies in the Venice Charter for architectural heritage (1964), the Florence Charter for historical gardens (1981), and the Lausanne Charter for archaeological sites (1990), you will hardly come across any statements on the subject of climate change and heritage conservation. Similarly, conferences and publications of the International Scientific Committee “Theory and Philosophy of Conservation and Restoration”, which is dedicated to the formation of principles in monument preservation, have so far not focused on climate protection and heritage conservation as a current challenge for the work of conservators. After all, an ICOMOS Charter on Climate Change and Heritage, planned for 2017 will soon add another facet to the apparatus of “doctrinal texts” of guidelines, resolutions, and declarations as well as recommendations and standards, which has been constantly expanded and differentiated since 1965.

Protecting art and historical monuments from the impacts of climate change or from inappropriate climate adaptation measures was initially a major concern of the debate on climate-related threats to monuments. Since then, there has also been a growing realisation that historical testimonies and cultural heritage are not only a threatened protected asset but also a potential illustrative material – possibly even as a learning space of the past for the development of resource-saving alternatives for the future. After all, it will be possible to understand and effectively contain climate- and environment-related monument risks only as part of the climate and environment emergency. For ICOMOS, the report “The Future of our Pasts: Engaging Cultural Heritage in Climate Action” (2019) formed a cornerstone for this. The “European Cultural Heritage Green Paper”, which was presented by Europa Nostra and ICOMOS in spring 2021 and translated by the German National Committee for Monument Protection and ICOMOS Germany together with Europa Nostra Germany and the Bund Heimat und Umwelt is probably the most recent contribution. In the paper, monuments are discussed as climate victims, and the example of monument and old building renovation is discussed as a contribution or even model for a more sustainable and climate-neutral development.

For the 2018 European Year of Cultural Heritage, the German Federal Foundation of Baukultur took up this reassessment programmatically in its report “Heritage – Inventory – Culture” and emphasised the importance and potential of the building and monument stock as a cultural, social, ecological, and economic value as well as the “key to a forward-looking building culture”. The sustainability campaign launched in 2020 by the German Foundation for Monument Protection under the slogan “Monuments for Future” sums up this position in a catchy and striking way.

Some may feel a sense of déjà vu in the face of the climate-related re-accentuation of the discourse on monuments, which not only sees cultural heritage as a potential victim of climate change but also emphasises its potential as a leading sector for resource-conscious and sustainable development. With conference and book titles such as “Das Denkmal als Altlast? Auf dem Weg in die Reparaturgesellschaft” (ICOMOS Hefte 1996) or “Das Konzept >Reparatur<” (ICOMOS Hefte 2000), ICOMOS Germany had defined monuments as a resource that not only represent cultural and historical values but which are also of ecological interest.

3.1.3. Introduction of Dr. Mechtild Rössler, Director of the UNESCO World Heritage Centre

Climate change is the defining issue of our time, and its impacts on cultural heritage – ranging from slow, gradual changes to extreme weather events – is now more evident than ever. It is therefore crucial to include the role of culture in climate protective measures – both as a common global good that needs to be protected from the impacts of climate change and an overarching resource for climate change mitigation and adaptation. UNESCO has been working specifically on the topic of climate change and nature / cultural heritage since 2005 and is actively engaged in addressing the impacts of climate change on culture and promoting its role in climate protection. In February 2020, on the eve of the 52nd session of the Intergovernmental Panel on Climate Change (IPCC), UNESCO launched a working group on culture and climate change in order to explore and share the role of culture as a key resource for climate change mitigation and adaptation.

The objectives of the joint meeting between ICOMOS, UNESCO and the IPCC are:

- to take inventory of the state of knowledge on culture, cultural heritage, and climate change in order to enrich future reports of the IPCC
- to bring together researchers and practitioners from different disciplines and perspectives from around the world, the Global South, and the Global North
- to build collaborations and conversations that will continue to grow and increase global attention to culture and cultural heritage as part of climate change

3.1.4. Introduction of Dr Birgitta Ringbeck, Federal Foreign Office

Climate change and the associated changes to our environment are now a top issue in Germany. However, cultural heritage and climate change are neither mentioned in the German Climate Legislation nor in the 2030 Climate Protection Programme.

On the other hand, the issue has long been part of international strategies and programmes. In 2007, the general conference of the contracting states of the World Heritage Convention adopted the “Policy Document on the Impacts of Climate Change on World Heritage Sites”. A [revised version](#), including a precautionary principle to minimise the risks associated with climate change, was submitted to the 23rd General Conference for adoption in November 2021. As a follow-up to the 2030 Agenda, the 2015 Climate Change Strategy was elaborated around the policy document on the integration of a sustainable development perspective into the processes of the World Heritage Convention. This highlights the links between climate change and sustainable development and defines World Heritage as not only an asset to be protected but also an important resource for the resilience and recovery of the communities affected.

Despite all the political manifestations, opinions are divided. Climate protection is primarily associated with the use of renewable energies and the energy optimisation of both new buildings and existing buildings. Sustainable actions such as the use of traditional and local

materials or the reuse and continued use of historical building fabric do not have the same priority. Instead of the listed and re-used historical stock and the intangible value associated with it, a World Heritage manager used a new but allegedly completely recyclable, monofunctional building as a prime example of the principle of sustainability on his World Heritage site.

It is therefore not surprising that the planning of wind turbines in the vicinity of World Heritage sites has high conflict potential, regularly triggering a reporting obligation to UNESCO in Paris. The World Heritage Centre usually responds with a request to suspend the approval procedure until a cultural heritage impact assessment has been submitted in order to clarify whether and to what extent the outstanding universal value of a site will be affected by a wind turbine. The World Heritage Centre, in cooperation with ICOMOS and IUCN as advisory bodies to the World Heritage Convention, as well as some representatives of sites and states, is currently preparing the guide "World Heritage and Renewable Energy: Guidance for Wind Energy Projects in relation to World Heritage" as a contribution to solving this permanent conflict.

The direct impacts of climate change on World Heritage sites are continuously monitored. Corresponding indicators are to be defined in the management plans of World Heritage sites. In addition, ICOMOS has developed a "Climate Vulnerability Index - a systematic way to rapidly assess climate change impacting World Heritage". According to IUCN monitoring, climate change is now the greatest threat to natural World Heritage sites. Within the framework of the World Heritage programme, a comprehensive set of instruments has thus been developed to address the consequences on the natural and cultural heritage; the 51 German World Heritage sites have also long since taken the initiative. However, an integrated national strategy for the protection of biodiversity and cultural heritage is still lacking.

3.1.5. Introduction of Dr Thomas Reineke, German Aerospace Center (DLR)

Dr Reineke represents the German IPCC Coordination Unit, which has been supporting the Federal Ministry for the Environment (BMU) and the Federal Ministry of Education and Research (BMBF) in their diverse activities as a member state of the IPCC since 1998. The coordination unit is located at the German Aerospace Center (DLR) and acts as the central point of contact for IPCC matters in Germany.

For the German government, the scientific integrity and political independence of the IPCC and its reports, which are based on multi-level and rigorous peer reviews by governments and scientific experts, is an invaluable asset.

The federal government relies heavily on scientific support and has therefore established the science platform "Climate protection" and the expert council for climate issues to guide the further design and implementation of the climate legislation. This is also the reason for the importance of today's workshop, which is ultimately intended to prepare a co-sponsored meeting on the topic of "Cultural Heritage and Climate Change" from within the German "cultural heritage and research community". "Co-sponsored meetings" (CSMs) would be used to flank and support the work of the IPCC. The IPCC has not defined any specific procedures for this instrument. Nor has it earmarked a separate budget. Co-sponsored meetings can help spark new debates and strengthen specific issues without compromising the integrity and political independence of the IPCC and its reports, which are based on multi-level peer reviews by governments and scientific experts.

It is therefore gratifying that the DBU has provided funding and facilitated an exciting and interesting discussion on "Cultural Heritage and Climate Change".

3.2. Discussion of the questions in the workshop

3.2.1 Question complex 1: Consequences of climate change on cultural and natural heritage and the vulnerability thereof

3.2.1.1. Summary of the answers from the questionnaire

From the responses received, it can be deduced that – compared with the situation 10–15 years ago – there are increasingly more experts in Germany working and researching on this topic. In general, the level of knowledge about the influence of climate change on cultural and natural heritage has improved significantly over the last few years, and there is a general basic understanding. This is because climate change is now recognised as a global problem – partly because of the noticeable increase in weather extremes. Climate research has also become quite advanced. In particular, the state of knowledge on the general regional changes of climate change is well consolidated at the scientific level, and research on this is being further advanced.

Despite the progress, there are still considerable research gaps (see table below). Especially in the field of heritage conservation, a sustainable and systematic knowledge base needs to be created. This is because research work often starts only when the damage patterns have become obvious. The fact that climate change is already threatening many cultural and natural heritage sites requires a certain continuity of research and scientific investigation. This is the only way to guarantee a more reliable data basis and ensure that the state of knowledge does not lag behind the impacts of climate change.

There is also a need for more detailed knowledge of regional conditions in terms of the influence on cultural and natural heritage. This is still quite fragmentary, and the regions are insufficiently prepared. There is too little detailed information on the regional climate impacts on cultural and natural heritage, especially with regard to precipitation and groundwater issues.

With regard to vegetation, another point mentioned is that vegetation requirements are rarely considered in scenarios and models. At the regional level, no forecasts can be made about the development of woody plants and other plants in historical gardens. However, the situation is different in areas with a high connection to nature and in mountainous regions, where a certain awareness of climate change processes has already been established because of experience in agriculture or natural space monitoring (e.g. the Alpine region). In addition, an ongoing substantiation of the factual situation and continuous measures to raise awareness are necessary.

Specific research needs are mentioned in particular (selection):

Historical buildings	<ul style="list-style-type: none">• Impacts of changed groundwater levels on foundations as well as foundation problems resulting from drawdown.• Damage correlations as a result of moisture, water, and dryness (e.g. in timber frames)• the influence of temperature-controlled building masses and surfaces on thermal comfort• Impacts of changing climatic conditions on historical building materials and constructions• Monument-compatible criteria for the prevention of potential damage as a result of climate change• Impacts on historical cities of vacancy resulting from climate change
----------------------	---

	<ul style="list-style-type: none"> • Empirical research on the role of built heritage as a store of experience in dealing with the impacts of climate change.
Natural heritage, historical parks and gardens	<ul style="list-style-type: none"> • Impacts of climate change on all areas of historical gardens and parks and associated elements (vegetation, water bodies, small-scale architecture, infrastructure and road safety, and biodiversity), • Resilience of plants, soil requirements, biological pest control. • Historic cultural landscapes are also considered a desideratum that needs attention.
Archaeology/archaeological monuments	<ul style="list-style-type: none"> • Conservation issues of organic materials such as wood, • Dealing with sites in lakes and bogs or with high alpine glacier sites affected by changing environmental conditions.
Intangible cultural heritage, indigenous peoples	<ul style="list-style-type: none"> • Hazard-specific risk analyses, • Definition of protection goals, • Extent of the threat to the natural and cultural assets of indigenous peoples.
General	<ul style="list-style-type: none"> • Establishment of a data collection of local and regional impacts and possible measures. • Strengthening of the monitoring of short- and medium-term consequences of climate change on cultural and natural heritage for better modelling of hazard zones • Risk and disaster management for cultural and natural heritage (targets and indicators) • Climate impact adaptations in cultural and natural heritage, • Protective functions in spatial planning concepts • Approaches to how current planning measures can be meaningfully aligned with the historical structure • Approaches to resolving conflicting goals.

In response to the question, “Which tools are currently used to assess vulnerability?”, the following are mentioned (selection):

Historical buildings	<ul style="list-style-type: none"> • General experience of those responsible on site based on many years of observation • Building and component monitoring • Subsoil and geological investigations • Flood simulations • Structural expertise • Dynamic simulations of moisture distribution and mass transport with data from climate models • Typologisation of historical buildings and constructions with the recording of typical damage patterns • Emergency and management plans, evacuation, safeguarding during extreme events
Natural heritage, historical parks and gardens	<ul style="list-style-type: none"> • Vitality analyses of trees (e.g. via satellite as in the context of Copernicus) and soil conditions (moisture and nutrient supply) • Analyses of groundwater levels

	<ul style="list-style-type: none"> • Soil and genetic analyses • Use of biochar • Climatic scenarios and models, remote sensing techniques
Archaeology/archaeological monuments	<ul style="list-style-type: none"> • Automated monitoring of the groundwater level (e.g. at archaeological settlement remains in bogs) • Systematic collection of data (dendroclimatological, palaeobotanical, speleothem proxies) in order to understand the influence of past climatic changes on societies, landscapes, and monuments and to draw conclusions about the current influences of climate change on cultural heritage • New formats of remote sensing, geophysics, and data aggregation on climate change and its influences.
General	<ul style="list-style-type: none"> • Monitoring of changes to natural and cultural heritage sites • Measurements of the groundwater level in/at significant cultural and natural heritage sites • Climate modelling, probabilistic risk analysis, risk management plan, event tree analysis, and expert reports • Instruments of spatial planning and urban development • Set of (interactive) databases that are used to analyse the vulnerability of geographical areas (prerequisite: interdisciplinary and cross-disciplinary knowledge) • Comprehensive maintenance and care in the form of climate and surface monitoring on and in the monument in order to promptly identify initial damage and changes and to correlate them with climate changes

On the question of new necessary instruments, methods, approaches, and/or technologies, the predominant assessment is that there are major knowledge deficits as well as a corresponding need for research in various fields of activity (selection):

Historical buildings	<ul style="list-style-type: none"> • Compatibility analyses of restoration materials at extreme temperatures • Interdisciplinary approaches for the analysis of direct impacts of climate change on buildings (stock and spatial-climatic situation), the immediate surroundings (topography, open spaces), and the infrastructure of building supply • Building surveys and mapping of phenomena in the area in order to obtain reliable figures on the level of endangerment and the size of the endangered population
----------------------	---

Natural heritage, historical parks and gardens	<ul style="list-style-type: none"> • More documentation and knowledge networking • More interdisciplinary research – sometimes applying expertise from the natural sciences to gardening practice • Vegetation monitoring (dendrometer, growth measurements = sap flow measurements).
Archaeology/archaeological monuments	<ul style="list-style-type: none"> • Systematic monitoring • Standardised data collection similar to the data collection of climate simulations in order to obtain comparative information • Approaches for measuring drought as a key indicator of vulnerability (air moisture, soil moisture, and groundwater levels).
General	<ul style="list-style-type: none"> • More knowledge needed in order to be able to include the different characteristics of cultural heritage (differentiated by type of hazard) • Practical knowledge and capacity building: local leaders must also be able to deal critically with the demanding data of a vulnerability assessment (i.e. they must be able to assess the strengths and weaknesses as well as the dependencies and uncertainty of the assessments themselves) • Systemic approaches for a better understanding of interrelationships • Increased international cooperation • Expansion of remote sensing; better assessment of ecological vulnerabilities with regard to water, soil, and vegetation • Ongoing awareness raising, networking, and inter- and transdisciplinarity.

3.2.1.2. Summary of the group discussions

In summary, very little research has been done worldwide on the impacts of climate change on cultural and natural heritage. This is seen as the reason why cultural and natural heritage has so far received little attention in the IPCC reports.

As is the case with the impacts of climate change on cultural and natural heritage, the contribution that cultural and natural heritage can make to climate impact adaptation has not yet been sufficiently studied.

Interdisciplinary work that brings together climate science and cultural heritage science requires consensus on terminology and nomenclature. This is not always consistent, especially with existing use of instruments and approaches. In order to bring the discussion to higher political levels, there must be conceptual certainty.

The term “vulnerability” is discussed” and is often used in combination with the term “resilience”. For a better understanding, please refer to the [website of the Climate Service Center Germany](#). According to this, vulnerability is “a measure of the susceptibility of a reference space, group, object, individual, and/or system to the consequences of an event. The system can be socio-ecological, technical, economic, institutional, or even political. However, vulnerability includes not only the characteristics of a space, system, or person but also their capacities for action in the form of coping and adaptation processes. Put simply, vulnerability describes how sensitively the respective object reacts to both internal and

external disruptive events. This includes the probability of potential damage (TURNER et al. 2003) as well as the ability of the system to cope with the influences in order to be able to maintain system services (BIRKMANN et al. 2013)".

One deficit is the management plans for World Heritage sites in which the connection between cultural (heritage) and climate change is not sufficiently integrated. Here, a systematic recording and thematic evaluation, possibly in the form of an overview article, is desirable.

A publication "Climate Protection & Climate Change – Application" in the form of an ICOMOS guide would also be desirable.

It is repeatedly emphasised that all issues in the thematic field must be considered in relation to the type of cultural and natural heritage (e.g. building, garden, and historical cultural landscape) as well as in relation to the various impacts of climate change (e.g. floods and drought). Different methods would have to be used, and different forecasting accuracies would be required.

It also becomes clear that there is little research on the role of practical monument preservation as a cultural practice or as a cultural technique – for example on occupational types that are "threatened with extinction" – and that potential impacts or requirements of climate change on these cultural techniques have not been researched at all.

A need is seen in the development of protection targets. These are an important basis for deciding which cultural and natural heritage must be protected against which impacts and to what extent.

There is a need for more research in the area of risk assessments. The [Climate Change Vulnerability Index](#) that has been developed could serve this purpose and needs to be substantiated for cultural and natural heritage as well as for the German-speaking region. In this context, the impacts on the use of the architectural heritage in a manner appropriate to the monument (e.g. heat) should also be taken into account as should measures for climate impact adaptation.

It is important to have overview papers that review the research findings made so far in order to intensify the exchange of existing research groups on the topic, among other things. Overview databases on project results are also needed. It is basically considered a problem that there are generally no peer-reviewed publications on the topic for the German-speaking countries. The research findings made so far should be processed in a way that is relevant to practice, tested in practice, and further developed.

There is a need to develop databases and associated parameters for climate change impacts on cultural and natural heritage. Data on the water level of rivers and streams were mentioned as an example of parameters to be set up in order to be able to install an early warning system (e.g. in the event of sinking groundwater levels). These databases must be accessible to all.

There is a need to adapt funding instruments to the necessary research questions. For example, research and testing of preventive measures should be eligible for funding. Likewise, the funding policy must be more sustainable. The focus should be on long-term projects and not only on small, time-limited projects. Subsidies for preventive and repair measures on monuments should be awarded only in connection with binding maintenance concepts or plans (duration at least 10–20 years).

Research results should be prepared more for practice and made "more readily" available for the respective questions.

In the discussion about the need for new approaches to dealing with the consequences of climate change, the need for trained people (e.g. structural engineers who have sufficient experience in dealing with historical structures) was raised.

An initial approach to raising awareness of climate issues among monument owners can be found in advisory talks by the monument protection authorities and the monument offices. With their presence on site, individual problems are to be identified and solutions developed. Lower monument authorities and specialist offices must take up the climate issue. However, this is complicated by the fact that most monument owners are private individuals and that the awareness of the consequences of climate change on cultural heritage depends on the regional and local assessment and concern of these individuals.

3.2.2. Question complex 2: Protection and adaptation measures against the consequences of climate change on cultural and natural heritage

3.2.2.1. Summary of the answers from the questionnaire

Based on the responses, it is clear that a stronger systematic understanding of the current situation needs to be created and that flexible approaches to traditional conservation issues need to be developed.

For the time horizons surveyed (short, medium, and long term), the aspects of networking and interdisciplinary thinking and action are seen as the most important key to success.

The questionnaire identifies the following measures that are necessary to increase resilience and protect cultural and natural heritage (selection):

Short-term	<ul style="list-style-type: none"> • General measures against floods, heavy rain, and hail • Documentation, data collection, minimum standard procedures for initial assurance, ongoing monitoring, and measurements • Awareness raising in the context of the overall issue of climate protection • More international and interdisciplinary networking, research, and funding • Incentives to implement recommended measures • Parks: New methods and materials (plant species and techniques, cultivation substrates), water, soil improvements, balancing of damage and causes of damage; survey of vulnerabilities, adaptation of climate models to the corresponding materiality (e.g. vegetation) • Buildings: comprehensive recording of damage and potential hazards, risk and damage history for each building in order to be able to derive measures
Medium-term	<ul style="list-style-type: none"> • Implementation of (applied) research findings (personnel, finances) • Early warning, exercises, insurance • Capacity building on the consequences of climate change: trades, local training and staff development in monument preservation • Energy consultants for listed buildings, create own advisory structures • Measures for summer thermal insulation • Regular evaluation and transfer of knowledge • Improvement of opportunities for the maintenance and optimisation of old trees, tree sites, and new planting • Climate adaptation frameworks

	<ul style="list-style-type: none"> • After 2030: no new registration of combustion engines • Specific measures for protection and conservation
Long Term	<ul style="list-style-type: none"> • It is too late: the intensifying impacts of global CO₂ emissions and climate change are unfortunately underestimated • Stop climate change as far as possible/mitigate factors that threaten monuments • Social transformation and awareness raising of sustainability in its full (ecological, economic, and socio-cultural) meaning • Rethinking of the conservationist understanding of resilience • Monitoring and networking in order to implement and readjust findings • Dike construction/use of tried and tested means/adapt university instruction • Conversion to climate-resistant tree species • Comprehensive climate mitigation frameworks in place that guide mitigation.

The following are defined as measures known to adapt to the consequences of climate change on cultural and natural heritage (selection):

Individual and institutional capacity building	<ul style="list-style-type: none"> • DAI: Ground check programme, “Zero Hour – A Future for the Post-Crisis Period”, education and training measures on the impact of climate change on cultural heritage (Iraqi-German Expert Forums project), KulturGutRetter project, • Federal Ministry of the Interior (BMI): Funding programme “Adapting urban spaces to climate change”, • UNESCO thematic documents such as “Guidance documents to manage disaster risks”, • Erasmus+ project “Sustainability for Architectural Heritage”, • Austria: Publication of the Federal Monuments Office “Standards für Energieeffizienz am Baudenkmal” (2021), national flood risk management plan (RMP 2015, BMLFUW 2016a for reducing the consequences of floods on human health, environment, cultural heritage, economic activities) or the Strategy for Adaptation to Climate Change (2017).
Improvement of the transfer of knowledge	<ul style="list-style-type: none"> • “Urban green” and energy-related urban renewal networks • International networks such as ICOMOS (CCHWG, ISCES, SDG), Climate Heritage Network, • Initiative alliance “Historical gardens in climate change” • Competence Centre for Nature Conservation and Energy Transition (KNE) • KulturGutRetter • European Heritage Academy • Austria: “Qualification seminar ClimB! Buildings and Neighbourhoods in Climate Change” (Centre for Environmental Sensitivity, Danube University Krems).

Improvement of technology transfer and delivery	<ul style="list-style-type: none"> • Energy consultants for monuments (possibly the German Energy Agency) • Research collaborations • KulturGutRetter • International coordination and cooperation between research institutions
Enabling of financing	<ul style="list-style-type: none"> • KfW, energy-efficient monument, federal–state urban development funding, urban greening, national urban development projects, former UNESCO World Heritage sites, • Funding similar to the topic of forest die back • Research funding within the EU HORIZON programme • Crowd-funding with the involvement of the population • Austria: “Green Finance Agenda” of the current government programme – private capital to solve social challenges in the field of climate protection and energy.
Establish systems to identify hazards and risks	<ul style="list-style-type: none"> • KERES research project (BMBF 2020–2023), • KulturGutRetter • Integrate weather forecasts into building monitoring • Monitoring
Risk management to provide information and data on climate change-related risks for timely decision making	<ul style="list-style-type: none"> • Establishment of systems to identify hazards and risks: KERES research project (BMBF 2020–2023), • Data provision on climate change scenarios in the ground check programme • Risk management often refers to natural hazards such as floods, avalanches, and other serious natural hazards • Approaches to climate risk management.

The following are some of the known approaches that are currently used or can be used to respond to losses (selection):

Historical buildings	<ul style="list-style-type: none"> • No imminent losses as a result of climate change • Interior and exterior of buildings: Improved indoor climate regulation for the preservation of works of art • Rethinking of the conservationist understanding of resilience • Deconstruction or relocation of endangered cultural heritage sites • Multimedia backup.
Natural heritage, historical parks and gardens	<ul style="list-style-type: none"> • Linking of experiential knowledge and research • New planting and the switch to climate-resistant tree species; selection of suitable alternative tree and shrub species • For infrastructure: different construction methods for paths, new materials • Increased irrigation management.

General	<ul style="list-style-type: none"> • The debate about the viability of reconstructions in monument preservation will/must increase in importance • Removal of endangered cultural property for storage in climatically less critical locations • Documentation/digitisation as measures before impending loss • Data collection, monitoring, prioritisation, and restructuring • Integration of climate change into risk management • New World Heritage and Climate Change Policy to be adopted in 2021 for implementation by 194 contracting states.
---------	--

The following conflicts between cultural and natural heritage protection and the necessary transformation towards sustainability are named (selection):

Historical buildings	<ul style="list-style-type: none"> • Energetic refurbishment of existing buildings (sensible measures for ecological sustainability not always best solution for cultural heritage protection) • Influence of new technologies such as charging columns and photovoltaic systems on monuments and associated changes in the cityscape • Non-sustainable tourism versus integrity and authenticity of sites, • Monument preservation and risk management because many (structural) protection measures affect the heritage value or the townscape • Abandonment of historical substance in favour of stronger resilience of new stock against the consequence of climate change • Insulation of the building envelope, ventilation systems, window replacement
Natural heritage, historical parks and gardens	<ul style="list-style-type: none"> • Use of renewable energy sources (wind turbines, solar energy) versus protection interests in cultural landscape/ensemble/world heritage sites (e.g. Wadden Sea or Upper Middle Rhine Valley) • Hardy species better adapted to climate change for historical gardens and parks • Higher proportion of sealed surfaces as a result of other path construction methods • Non-native plants and invasive species as a result of conversion to climate-adapted plants • Introduction and spread of pathogens and pests through nursery stock • Increased use of non-sustainable materials (plastic) in the course of automatic irrigation systems • Increased recourse to water resources as a result of increased irrigation
General	<ul style="list-style-type: none"> • Conflict as a result of technophobia of decision-makers and in society: social-ecological transformation is achievable only through

	behavioural change and not through technology alone <ul style="list-style-type: none"> • Joint definition of goals
--	---

3.2.2.2. Summary of the group discussions

Interdisciplinary cooperation requires a clear definition of terms such as “resilience”, “protection”, and “transformation” because there is a different understanding depending on the respective discipline.

In addition to the points listed in the table above, the following aspects were mentioned in the discussion: An immediate need is seen in the realignment of traditional standards. Consequently, conventional paradigms of cultural property protection/monument preservation must be abandoned and new standards must be imposed. This concerns both the realignment of conservation values and the use of alternative materials because pure conservation will prove insufficient. The replanting of robinia (*Robinia pseudoacacia*) instead of common beech (*Fagus sylvatica*) because of its better climate adaptation was mentioned as one example from garden monument conservation.

Furthermore, an intensive discussion on the extent to which historical stock and appearance can be preserved within the framework of climate adaptation is needed. One challenge is seen in the preservation of the expressive value of monuments. This requires new strategies in the decision-making process. The extent to which stock and appearance can be preserved must be quantified.

It is considered necessary to implement climate advisors for cultural heritage as a new professional field – similar to energy advisors for monuments.

In the long term, solutions are needed to harmonise the use of renewable energy sources (wind/photovoltaics) or energy measures (insulation) with the protection of cultural assets.

3.2.3. Question complex 3: The role of cultural and natural heritage in climate change mitigation or in minimising the impacts of climate change

3.2.3.1. Summary of the answers from the questionnaire

On the question of what concrete contributions the cultural and natural heritage can make to social resilience, a number of keywords are mentioned (e.g. social connectedness also through voluntary work, recreation, jobs, biodiversity, enhancement of quality of life, the monument as a storehouse of knowledge and historical model for the future).

Challenges and obstacles mentioned are, for example, that resilience should always be seen as a process rather than a state. In addition, different spatial scales and contexts must be considered. Intensive individual examinations are necessary; these require increased effort. Cultural heritage is dynamic and subject to constant change (e.g. in terms of destruction through overuse) and thus offers potential for resilient solutions. Furthermore, the insufficient perception and appreciation of cultural and natural heritage among owners, planners, and authorities is complained about. The lack of documentation or access (e.g. in GIS systems) is also recognised as an obstacle.

The role that cultural and natural heritage has in climate protection and adaptation to climate change is answered as follows in the questionnaires:

Historical buildings	<ul style="list-style-type: none"> • Built-in “embodied energy” with a wide-ranging life cycle
----------------------	---

	<ul style="list-style-type: none"> • Reparability and recyclability of materials and constructions • Natural and renewable building materials • Regional, weather-adapted construction • Resource protection also through transformability (Monumentum ad Usum project, Danube University Krems), • Avoidance of land use
Natural heritage, historical parks and gardens	<ul style="list-style-type: none"> • Storage for water collection during heavy rain events and of organic carbon products • Groundwater recharge • Damage highlights the urgency to act • World Heritage sites can play an important role in sequestering CO₂ (Blue-carbon-report WHC).
Archaeology/archaeological monuments	<ul style="list-style-type: none"> • The ArchaeoForest project is concerned with increasing climate resilience in the forest by incorporating archaeological findings
General	<ul style="list-style-type: none"> • Cultural contribution to building community resilience to climate change

Measures to reduce negative impacts in the different work areas are described:

In theory	<ul style="list-style-type: none"> • To provide political and social impetus for action on UNESCO programmes • Adherence to the sustainability strategy of the Federal Government • Guidelines for energy efficiency in listed buildings • Safety strategies for natural disasters (ProteCHt2Save project), • Improvement of the skills of policy makers (STRENCH project) • Climate change policy at UNESCO • Own research • Development of strategies • Use of biochar • Networking to exchange information on life cycle analysis (Cultural Heritage Network, Working Group 3).
In practice	<p>Planning</p> <ul style="list-style-type: none"> • Flood protection plans • Site management plans • Preparation of handouts (VDL interior insulation and summer thermal insulation) • For natural heritage: Monitoring of conservation in the IUCN World Heritage Outlook <p>Monument protection</p> <ul style="list-style-type: none"> • Development of local capacities for the maintenance of cultural heritage

	<ul style="list-style-type: none"> • Investigation as a basis for adaptation measures (regulation of radiation ingress, ventilation) to protect art objects • Energetic retrofitting • Mediation work within the framework of practical advice in monument preservation • Calculation for summer thermal insulation <p>Energy</p> <ul style="list-style-type: none"> • Improvement of the biomass cycle • Energy saving for heating • Use of sheep instead of mowing <p>Innovative water management</p> <ul style="list-style-type: none"> • Green roofs • Rainwater harvesting/retention areas • Extraction of activated carbon • Consideration of driving rain events <p>General</p> <ul style="list-style-type: none"> • Increasing the competence of practitioners (ClimB! project Buildings and neighbourhoods in climate change) • Climate protection as an all-encompassing ask in all measures
--	---

The level of scientific knowledge on the possible role of cultural and natural heritage in strengthening societal resilience is generally considered to be low.

Cultural and natural heritage as well as cultural practices of heritage management and governance models can influence individual and collective climate action. Examples of this are offered by the DBU project “Historical Gardens and Society” 2020. Other examples mentioned are:

- Public transport to cultural and natural heritage sites through less long-distance travel during the corona pandemic
- The increased appreciation for the immediate living space and the local environment
- The participation or role of human labour in processes in monument preservation
- The involvement of the next generation (e.g. young experts in the Austrian spatial development concept or in the youth building huts concept of the German Foundation for Monument Protection).

Well-known examples in which embodied energy was a central argument in assessing the sustainability of measures include:

- Successful funding application for innovative water management for climate adaptation to preserve green spaces and historical parks in Potsdam
- Energy requirements of new and existing buildings play a central role in the [Project Monumentum ad Usum](#),
- Urban heritage protection
- Stock-oriented urban development
- Biennial contribution 2012 Reduce, Reuse, Recycle

It was noted that there is a lack of reliable data for the embodied energy of the existing models and that there is not enough in many consideration models or financing models and reasonableness calculations and that the “embodied energy” is not a relevant variable for the consideration of archaeological monuments.

3.2.3.2. Summary of the group discussions

In the group discussion, it was apparent that there was a general need for a definition of “resilience”, “vulnerability”, and “rehabilitation of old buildings”. These are frequently used terms in the discourse but are not uniformly understood.

One suggestion for a definition that takes into account the various risk factors and dimensions of resilience has already been developed in the [Shelter-Project](#).

Resilience is a systemic concept that meets another system “cultural heritage” (e.g. in cultural landscapes) with the resulting fuzziness. In addition, it is necessary to work out the difference between resilience and sustainability. The role of intangible cultural heritage on issues of resilience is still not completely resolved.

One approach to make better use of the contribution of cultural and natural heritage to resilience building could lie in the concept and promotion of cultural diversity, which, like biodiversity, is a goal of sustainable policy.

It also seems sensible to define the term “cultural and natural heritage” broadly in the sense of the World Heritage programmes of UNESCO: Mention is made of earlier specialist contributions to the subject such as the programmatic speech by Walter Bunsmann, who, as early as 1984, understood the the preservation of monuments to be a sustainable approach.

The life cycle analyses have not yet been systematically introduced into the debates on building and demolition and are described as an obstacle to the discussion.

The complexity of this topic with its sectoral boundaries and (value) conflicts – which must first be overcome in order to spread the state of knowledge – are a major obstacle to understanding.

So far, there is no uniform platform for documenting results. A Greek project is trying to gather information from the different actors and initiatives ([Follow up of Flexible Mechanism – CCICH2019](#), Urban Heritage Climate Observatory [UHCO](#)).

It is generally regarded as an obstacle that heritage protection is often seen as a hindrance to climate protection. Instead, it should be made clear that the protection of historical monuments, and in particular the preservation of buildings, contributes to climate protection. In contrast, questions of renewable energy are often discussed in contradiction to the protection of historical monuments. For example, testimonies of the traffic-friendly city or modern infrastructures no longer fit into a world that is more climate-friendly.

In the opinion of the stakeholders, the generalisations put forward by the monument preservation authorities (“monument preservation is climate protection”, “embodied energy”) are too sweeping. Attempts to prove this and calculate it using models are unreliable because they are influenced by a variety of unclear factors and detection targets. However, it is true that the repair and further development of the built cultural heritage prevents construction waste.

Monument preservation may have to abandon traditional conservation objectives (e.g. acceptance of wind turbines in cultural landscapes, solar panels on historical buildings).

The largest part of the energy consumption of buildings is the energy during use – and not the manufacturing energy (embodied energy). (80% vs 20%). Monument preservation needs to sharpen its argumentation on the basis of robust calculations and evidence.

As a proposed solution for improving the scientific knowledge on the strengthening of resilience, it was recommended to collect concrete data, including the “building stock worth preserving”, in the short and medium term. It would be helpful to collect and evaluate data from energy efficiency measures that have been carried out and make it available as a reference work for planners – similar to the BKI Building Cost Index, which lists the costs averaged over the past years and can be used for a cost estimate. This can be done only in a specially created and qualified institution.

Similarly, education and training for all departments and professions involved in cultural heritage must be significantly intensified and improved for the complex discussions.

Overall, however, it is warned to not focus solely on the building stock but rather to strive for an overall ecological approach.

A reformulation of the narrative or imperative of “cultural and natural heritage must be protected” to be in line with the promotional insight would be useful: “Cultural and natural heritage makes a significant contribution to resilience and climate protection”.

One consequence of the assumed significant contribution of cultural and natural heritage to resilience could also be that the reversibility discourse or reconstruction debate is re-established as a reaction to a damaging event.
aufstelle.

3.2.4. Question complex 4: Consideration of the impacts of climate change on cultural and natural heritage in policy frameworks

3.2.4.1. Summary of the answers from the questionnaire

Strategy papers that refer to the impacts of climate change on cultural and natural heritage were mentioned:

- The position paper on science and research and the staffing needs of the Working Group of German Castle Gardens
- The [Sustainability Report](#) of the Federal Government Commissioner for Culture and the Media 2020
- The [National Strategy for Critical Infrastructure Protection](#) of the Federal Ministry of the Interior
- The [adaptation strategy](#) of the EU
- Reports of the DAI in the Subcommittee on Foreign Cultural and Educational Policy of the Bundestag
- UNESCO policy papers
- [Austrian Strategy for Adaptation to Climate Change](#) (Flood Protection for Cultural and Natural Heritage)
- Recommendation of the German Association of Cities “[World Heritage Cities Give Impetus](#)”
- [New Leipzig Charter](#)
- City Centre White Paper “[Strong Centres for our Cities and Towns \(BBSR\)](#)”.

However, several experts share the view that little or no political consideration has been given to the strategy papers so far. At the EU level, an “Open Method of Coordination” group on Cultural Heritage and Climate Change is working on the issue as part of the Work Plan for Culture 2019–22.

Requirements named were:

- The insufficient consideration of the conservation of gardens in times of climate change
- A general requirement in the building regulations to justify the demolition of structures
- The appreciation of the topic in national, country, and municipal adaptation strategies
- Gaps remain in the promotion of concept development and funding of concrete measures for cultural and natural heritage.

Thus, a lack of liabilities and incentives hinders the rapid yet careful adaptation of cultural and natural heritage to climate change.

In particular, the German federal sustainability strategy and its implementation at the state and municipal level should focus more on the integration of cultural and natural heritage.

Policy frameworks, guidelines, and laws in the German-speaking world that are linked to the protection of cultural and natural heritage from the impacts of climate change are named:

- 2030 Agenda
- Monument protection laws in Germany, Austria, and Switzerland
- Cultural heritage as a protected good in environmental assessments
- Cultural Heritage as a Protected Asset in the EU Floods Directive
- Austria Spatial Development Concept 2030
- National Climate and Energy Plan for Austria
- Green Finance Agenda
- Building and spatial planning laws in Austria
- Guidelines of the Austrian Institute for Structural Engineering.

It is noted that such a presentation requires legal expertise and that the guidelines (e.g. on the energy improvement of buildings) are undifferentiated.

Austrian provincial legislation could be cited for the implementation of the guidelines in practice. Even in environmental assessments, in which cultural heritage has been an integral protected good for 30 years, it has not yet played a special role in procedural practice.

The gaps are generally the lack of knowledge of the actors involved as well as the lack of coordination among them.

3.2.4.2. Summary of the group discussions

There are several projects in Germany and Austria dealing with the sustainability and resilience of built cultural heritage – a source of knowledge that has not been tapped so far. The narrative “cultural heritage costs only money” fails to recognise the positive social, economic, and ecological effects.

In order to justify the role of cultural and natural heritage in climate change in a comprehensible way, it is necessary to substantiate possible contributions to climate protection and adaptation with figures. This will require the involvement of economics.

Non-existing legal frameworks are an obstacle to adequately considering the role of cultural and natural heritage in processes. Proposals for new regulations or exciting ideas would be necessary in order to approach politicians and better position the topic of cultural and natural heritage in climate protection policy and in the discourse on sustainability.

3.2.5. Question complex 5: Learning from the past for the future management of cultural and natural heritage

3.2.5.1. Summary of the answers from the questionnaire

When asked what lessons can be learned from past climate change processes, it was stated that climate change and its impacts on human behaviour are quite diverse and thus difficult to compare (climatic causes for wars, settlement behaviour, and the like have been studied). However, there are past examples of ranges of variation within which climate adaptation is possible.

Historical buildings	<ul style="list-style-type: none"> • Sustainable building • Climate-friendly building • Structural building protection • Natural repairable building materials • Construction methods • Opening of historical buildings only if it is justifiable in terms of conservation
Natural heritage, historical parks and gardens	<ul style="list-style-type: none"> • Negative examples of the overuse of landscapes • In horticultural planning and action, there are examples of how climate extremes have been dealt with; some of these could become relevant again today • Functioning and resource-saving water management • Positive examples of legislation and regulation for sustainable water management • Adapt planting for climate compatibility • An individualised and sensitive approach to garden artworks
General	<ul style="list-style-type: none"> • Establishment of protection strategies • Search for historical adaptation strategies and transfer them to today • Material cycles/circular economy • Upcycling (better than recycling) • Cross-generational thinking and acting.

A learning process that focuses more on prevention instead of a “disaster driven policy” must develop from the current situation. Knowledge from the past in combination with new findings are of outstanding importance for adaptation strategies of cultural and natural heritage (e.g. construction methods, material use, reparability, use of green and blue infrastructure, and climate-relevant aspects in site analyses). However, the application and transfer of scientific knowledge into practice is still in its infancy.

The gaps and missing parts were named in detail:

Historical buildings	<ul style="list-style-type: none"> • Data gaps for life cycle analysis; simple tools needed • Evaluate potentials: dendrochronological archives, soil cores, other material samples • Collect data in regions that are particularly affected or threatened
----------------------	---

Natural heritage, historical parks and gardens	<ul style="list-style-type: none"> • For historical parks and gardens, there is a lack of ecological baseline surveys and corresponding vulnerability assessments, • An integrative approach with regard to large-scale cultural landscapes is missing.
General	<ul style="list-style-type: none"> • The actual extent of the damage that has already occurred is not known • There is a lack of models for the interpretation of data from the past for development in the future (Project on the World Heritage Lakes of Ouninaga Chad, University of Cologne Africa Research Centre) • The consideration of intangible cultural heritage in hazard-specific risk analyses • The possibility of deriving conservation objectives from the conservation value of individual cultural heritage elements • The training of the actors • The adaptation of process control models • The adaptation of funding programmes and funding strategies

Current methods for transferring the historical human-environment experience into current approaches are mentioned:

- Combining historical building research with technical building research and modern technological development
 - Create and explore building typologies
 - Simulations
 - Inclusion of climate issues, vegetation, and similar in historical building research/building archaeology
 - Gathering of experience with previous building materials and forms and implementing best-practice projects via tests
- Adoption of summer-winter building operation strategies (seasonal differentiation),
- Site adaptation
- Use of regional resources
- Evaluation of historical best practice examples of sufficiency strategies
- Reduce, reuse, recycle (Muck Petzet),
- Work with historical markers (high water markers, tree rings)
- Archival research on historical eyewitness accounts
- Archival evaluation of climate history data in reports and chronicles
- Processing of historical and ecological data
- Evaluation of archives of historical parks and gardens (dendrochronology, soil outcrops, horticultural records)
- Adoption of palaeoclimatic methods (ice core drilling)/palaeoclimate modelling
- Combination of archaeological on-site data (dendrochronology) with palaeoecology (off-site data)
- Documentation of intangible cultural heritage
- Documentation of local and indigenous knowledge systems
- Oral history

As methods that are needed:

- Transfer of research into real applications (e.g. water management, construction, and sustainable agriculture)
- Exploration of adaptation strategies for protected objects during their lifetime

- Networking and cooperation between disciplines
- Understanding of different research methods
- Use of locally available knowledge from the population
- Science experiments
- Methods for source and archival work
- Exchange and knowledge platform
- Holistic approaches to integrate cultural and natural heritage approaches
- Research is needed for method development
- Establishment of real labs and experimental spaces for cultural and natural heritage

3.2.5.2. Summary of the group discussions

Current research at the German Archaeological Institute (DAI) on human adaptation to climate change in the past (e.g. desertification, water management, dam building, legislation on water use) shows that these were sometimes brutal negotiation processes; it also shows the tipping points after which adaptation was no longer possible.

In the discussion, further demands and approaches to solutions emerged: Historical building research has never systematically questioned the existing building stock as to whether it has adapted to new requirements because of climatic change but rather has concentrated on manufacture and construction. A major requirement of historical building research would be to answer specific questions: Have there actually been adaptations to warmer periods? How have building techniques been culturally determined or influenced by the climate? How have buildings – and users – adapted to climatic conditions or changes?

Integrative approaches to modelling urban developments should include cultural and natural heritage.

Research should focus on principles that can be applied to different types of cultural and natural heritage. However, results that describe the processes in sufficient detail can be expected only at the local level. This is made more difficult by the fact that chairs of regional history have been downsized or even eliminated in the recent past.

3.2.6. Summary of the group discussions overall

The moderators Constanze Fuhrmann (Question complex 1–2) and Dorothee Boesler (Question complex 3–5) summarise the results of the group discussions as follows:

Unfortunately, there is no overview literature for the German-speaking world – a requirement that should be remedied as soon as possible. Overall, it must be stated that there is little research on the impact of climate change on cultural and natural heritage in German-speaking countries. It would also be important to publish the applications and guides on climate change and cultural and natural heritage. Similarly, World Heritage management plans should be questioned and evaluated as examples of how to deal with climate change.

The discussion shows that the term “climate change” seems too narrow. It would be better to focus on the “anthropogenic impacts on heritage” as a whole.

An important discussion raises the question of what data climate researchers need from the cultural and cultural heritage side, how regional influencing variables can be made clearer, and how macro data can be better interlinked with micro data.

The general postulate is to overcome sectoral boundaries. The lack of knowledge across the board and inadequate legal foundations are further obstacles to the successful integration of cultural and natural heritage into the climate discourse. This means expanding the narrative,

“cultural heritage must be protected” to “cultural heritage is an essential contribution to the resilience of society”. The often irreconcilable juxtapositions or conflicts between monument protection and climate protection (e.g. on the topic of renewable energies) are conflicts of values that can be resolved only by looking at them more closely as individual cases. The economic sciences are also needed for an appropriate appreciation of the achievements of cultural and natural heritage in the climate discourse.

Finally, climate-related and heritage-friendly funding programmes are needed for research, data collection, and the transfer of results into practice.

In the plenary session, it was once again emphasised that the loss of cultural and natural heritage would lead to the loss of their achievements for the present generation be lost and that sources of future historical research would dry up. In the German discussion, the consideration of historical cultural landscapes and their contribution to biodiversity has been missing so far.

Broadening the perspective to include sustainability as a whole appears to be an important aspect. World Heritage sites could be suitable as pilot projects (possibly also as targeted funding projects) to undertake regional observations on degrees of endangerment and change. The results of these could also be generalised to other cultural properties.

3.2.7. Summary of the final statement by Dr Johanna Leissner, Fraunhofer Institute for Silicate Research, Fraunhofer EU Office Brussels

Since the EU Commission launched the first research project on cultural heritage and climate change in 2003, the topic has become increasingly important. Today, 28 countries are participating in the working group on climate change and cultural heritage initiated by the EU Commission.

Today's workshop greatly advanced the exchange and discussion on climate change and its consequences on our cultural heritage. Nevertheless, it became clear that a stronger basis must be created for the IPCC – from evidence-based data to a clean nomenclature to a common platform for all stakeholders. In Germany, for example, it is not only the German Federal Foundation that is called upon. Instead, multi- and interdisciplinary research projects in cooperation with partners from climate research, spatial planning, disaster prevention, agricultural research, restoration, and monument conservation should be pursued in a targeted manner. Finally, our cultural heritage is highly threatened by climate change, which inevitably has negative consequences for society, the economy, and research.

Cultural heritage has not yet been mentioned in the sustainability strategy of the Federal Republic of Germany. This clearly shows that, first of all, the political level has to be activated in order to be able to establish the long-needed awareness. Data must be collected and published even more intensively, and educational work must be carried out with politicians and society and for our next generation. Our aim is to provide a report as well as explicit recommendations for the EU Commission and its member states in early 2022.

4. Conclusions

From the perspective of the facilitators from the DBU and ICOMOS Germany, the workshop was extremely successful. For the first time, the opportunity arose to discuss the topic in an interdisciplinary way. The experts were also able to get to know each other as well as their different perspectives on the topic from the various disciplines. The goal of initiating a joint discussion has been achieved and has already found its first opening to the wider specialist public in a monument salon organised by the DBU.

However, there is no question that the discussion would need to be deepened and clearly structured. The workshop has laid the basis for a structured discourse.

A major requirement for further work is to reach an understanding across the disciplines on the fundamental concepts without which the necessary interdisciplinary cooperation does not seem possible. The discussion showed that many individual aspects were compiled by the experts. However, there is still no overview or system in which these aspects can be discussed in depth. An overview of previous research is also lacking.

Some of the questions in the questionnaire produced only a small amount of information and could not be followed up in the discussion. The amount of information gained thus fell short of expectations. For some questions, the experts were unable to share any considerable practical experience.

The next steps to be derived from the workshop discussions are the development of data collection as well as the need to involve politics.

The expert hearing and this documentation owe their existence to the intensive collegial cooperation of numerous participants. In addition to the steering group formed jointly by the DBU and ICOMOS with Constanze Fuhrmann (DBU) and Dorothee Boesler, Jörg Haspel and Marcy Rockman (ICOMOS), special thanks are due to Marie Baudis, Dörthe Hellmuth, Gaia Jungeblodt, Gundula Lang, Marie-Laure Lavenir, Andrew Potts, and Bernd Vollmar for their committed participation.

List of annexes

- [1 Workshop-Agenda](#)
- [2 List of participants](#)
- [3 Project- und Publication profiles](#)

Annex 1: Workshop-Agenda



Tagesordnung für den Experten-Workshop am 9. Juli 2021 zur Unterstützung des Internationalen Meetings von UNESCO-ICOMOS-IPCC über Kultur, Kulturerbe und Klimawandel im Dezember 2021

Datum: 9. Juli 2021
Uhrzeit: 09:30-17:00 Uhr
Ort: Zoom- Meeting

Zoom Zugangsdaten

Link: <https://zoom.us/j/99092360106?pwd=MUp2d2FhM2MwL1J2YzZXNERlMFBxZz09>
Meeting ID: 990 9236 0106
Kennwort: 360430

Eröffnung

Begrüßung	Frau Constanze Fuhrmann (DBU, Referat Umwelt und Kulturgüter) Herr Prof. Dr. Jörg Haspel (ICOMOS Deutschland)	09:30
Einführung	Frau Dr. Mechtild Rössler (Welterbezentrums UNESCO) Frau Dr. Birgitta Ringbeck (Koordinierungsstelle Welterbe - AA) Herr Dr. Thomas Reineke (DLR)	09:40

Austausch über die Fragenkomplexe

Gruppe 1	Folgen des Klimawandels auf Kultur- und Naturerbe und dessen Vulnerabilität Schutz- und Anpassungsmaßnahmen gegen die Folgen des Klimawandels auf Kultur- und Naturerbe	10:00 - 12:00
----------	--	---------------

Gruppe 2	<p>3. Die Rolle von Kultur- und Naturerbe bei Klimaschutzmaßnahmen bzw. zur Minimierung der Auswirkungen des Klimawandels</p> <p>4. Die Berücksichtigung der Auswirkungen des Klimawandels auf Kultur- und Naturerbe in politischen Rahmenwerken</p> <p>5. Lernen aus der Vergangenheit für den zukünftigen Umgang mit Kultur- und Naturerbe</p>	10:00 – 12:00
Pause		12:00 – 13:30
Zusammenfassung		13:30 - 13:45
Austausch über die Fragenkomplexe		
Gruppe 1	<p>3. Die Rolle von Kultur- und Naturerbe bei Klimaschutzmaßnahmen bzw. zur Minimierung der Auswirkungen des Klimawandels</p> <p>4. Die Berücksichtigung der Auswirkungen des Klimawandels auf Kultur- und Naturerbe in politischen Rahmenwerken</p> <p>5. Lernen aus der Vergangenheit für den zukünftigen Umgang mit Kultur- und Naturerbe</p>	13:45-15:45
Gruppe 2	<p>Folgen des Klimawandels auf Kultur- und Naturerbe und dessen Vulnerabilität</p> <p>Schutz- und Anpassungsmaßnahmen gegen die Folgen des Klimawandels auf Kultur- und Naturerbe</p>	13:45-15:45
Zusammenfassung Abschlussdiskussion		15:55-16:30
Abschluss		
Schlussbemerkung	Frau Dr. Johanna Leissner (Fraunhofer Büro Brüssel)	16:30
Ausblick	<p>Frau Constanze Fuhrmann (DBU, Referat Umwelt und Kulturgüter)</p> <p>Herr Prof. Dr. Jörg Haspel (ICOMOS Deutschland)</p>	16:45

Annex 2: Liste of Participants

<i>Titel</i>	<i>Vorname</i>	<i>Nachname</i>	<i>Institution</i>
	Marie	Baudis	ICOMOS Deutschland
Prof.	Paul	Bellendorf	Otto-Friedrich-Universität Bamberg
Dr.	Dorothee	Boesler	ICOMOS Deutschland
	Constanze	Fuhrmann	Deutsche Bundesstiftung Umwelt (DBU)
Dr.	Inge	Gotzmann	Bund Heimat und Umwelt in Deutschland (BHU)
Prof.	Stefan	Greiving	Technische Universität Dortmund
	Franziska	Haas	ICOMOS Deutschland
Prof.	Albert	Hafner	ICOMOS Suisse
Prof.	Jörg	Haspel	ICOMOS Deutschland
Dr.	Dörthe	Hellmuth	ICOMOS Deutschland
	Frank Pieter	Hesse	ICOMOS Deutschland
Dr.	Kristina	Holl	Otto-Friedrich-Universität Bamberg
Dr.	Verena	Jakobi	Landesamt für Denkmalpflege Hessen
	Gaia	Jungeblodt	ICOMOS International
Dr.-Ing.	Roswitha	Kaiser	Generaldirektion Kulturelles Erbe Rheinland-Pfalz
Prof.	Ralf	Kilian	Fraunhofer-Institut für Bauphysik IBP
Dr.	Lola	Kotova	Climate Service Center Germany (GERICS), Helmholtz-Zentrum Geesthacht
Prof.	Norbert	Kühn	Technische Universität Berlin
Dr.	Gundula	Lang	ICOMOS Deutschland
Dr.	Johanna	Leissner	Fraunhofer Institute IAP, IBP, ICT, IGB, IMW und ISC
Dr.	Roman	Luckscheiter	Deutsche UNESCO-Kommission e. V.
	Anke	Michaelis-Winter	Bundesministerium des Innern, für Bau und Heimat (BMI)
Dr.	Uwe	Mikolajewicz	Max-Planck-Institut für Meteorologie
Jun.-Prof.	Carola	Neugebauer	RWTH Aachen
Dr.	Katja	Piesker	Deutsches Archäologisches Institut (DAI)
Dr.	Gregor	Radinger	ICOMOS Austria
Dr.	Thomas	Reineke	Deutsches Zentrum für Luft und Raumfahrt e. V. (DLR)
Dr.	Brigitta	Ringbeck	Auswärtiges Amt
Dr.	Matthias	Ripp	Stadt Regensburg
Dr.	Marcy	Rockman	ICOMOS International
Prof.	Michael	Rohde	Stiftung Preußische Schlösser und Gärten
Dr.	Mechtild	Rössler	UNESCO World Heritage Centre
	Jan	Schultheiß	Bundesministerium des Innern, für Bau und Heimat (BMI)
Prof.	Stefan	Simon	Staatliche Museen zu Berlin - Preußischer Kulturbesitz
Dr.	Regina	Smolnik	Landesamt für Archäologie Sachsen
Dr.	Bernd	Vollmar	ICOMOS Deutschland
Dr.	Ulrike	Wendland	Deutsches Nationalkomitee für Denkmalschutz

Annex 3: Project- and Publication profiles

Projekt- und Publikationssteckbrief

Project and publication profile

Lfd. Nr. <i>consecutive No.</i>	Bezeichnung / Erläuterungen / Bibliographische Angaben <i>Designation / Explanations / Bibliographical data</i>	<i>From Obstacle to Resource: How Built Cultural Heritage Can Contribute to Resilient Cities</i> <i>DOI:10.1007/978-3-319-57165-2_8</i> <i>In book: Going Beyond. Heritage Studies. (pp.99-112)Publisher: SpringerEditors: Albert MT, Bandarin F., Pereira Roders A. Project: PhD Project: Heritage-based urban development</i>
	Bearbeitungsjahr <i>Processing year</i>	<i>September 2017</i>
	Stichpunkte zu den Inhalten <i>Key points about the contents</i>	Resilience, Kulturerbe als Motor einer nachhaltigen Stadtentwicklung
	Projektergebnisse / <i>Project results</i>	<input type="checkbox"/> Website <input type="checkbox"/> Datensammlung / <i>collection of datas</i> <input checked="" type="checkbox"/> Aufsätze (mit Peer Review) / <i>(peer reviewed) essays</i> <input type="checkbox"/> Sonstige Aufsätze / <i>other essays</i> <input type="checkbox"/> Monographien / <i>monographs</i> <input type="checkbox"/> Sonstiges, bitte bezeichnen / <i>Other, please specify</i>
	Relevanz für/ <i>relevant for</i>	<input type="checkbox"/> Folgen des Klimawandels/Vulnerabilität / <i>Impact of climate change/vulnerability</i> <input checked="" type="checkbox"/> Schutz- und Anpassungsmaßnahmen / <i>climate impact adaptation / protection</i> <input checked="" type="checkbox"/> Die Rolle von Kultur- und Naturerbe bei Klimaschutzmaßnahmen / <i>Roles of culture and heritage in transformative change</i> <input type="checkbox"/> Auswirkungen des Klimawandels in politischen Rahmenwerken / <i>climate change impacts in policy frameworks</i> <input type="checkbox"/> Lernen aus der Vergangenheit / <i>Learning from the past</i>
	Erläuterung / <i>explanatory note</i>	

Projekt- und Publikationssteckbrief

Project and publication profile

Lfd. Nr. <i>consecutive No.</i>	Bezeichnung / Erläuterungen / Bibliographische Angaben <i>Designation / Explanations / Bibliographical data</i>	<i>Krisen: Chancen für die Altstadt? Zur Rolle des gebauten Kulturerbes als urbaner Resilienzfaktor [Crisis: an Opportunity for Historical Cities]</i> <i>M Ripp</i> <i>Forum Stadt. Vierteljahrszeitschrift für Stadtgeschichte, Stadtsoziologie</i>
	Bearbeitungsjahr <i>Processing year</i>	2013
	Stichpunkte zu den Inhalten <i>Key points about the contents</i>	Gebautes Kulturerbe; Resilienzfaktor, Materialität, Stadtsoziologie
	Projektergebnisse / Project results	<input type="checkbox"/> Website <input type="checkbox"/> Datensammlung / collection of datas <input checked="" type="checkbox"/> Aufsätze (mit Peer Review) / (peer reviewed) essays <input type="checkbox"/> Sonstige Aufsätze / other essays <input type="checkbox"/> Monographien / monographs <input type="checkbox"/> Sonstiges, bitte bezeichnen / Other, please specify
	Relevanz für/ relevant for	<input type="checkbox"/> Folgen des Klimawandels/Vulnerabilität / Impact of climate change/vulnerability <input checked="" type="checkbox"/> Schutz- und Anpassungsmaßnahmen / climate impact adaptation / protection <input checked="" type="checkbox"/> Die Rolle von Kultur- und Naturerbe bei Klimaschutzmaßnahmen / Roles of culture and heritage in transformative change <input type="checkbox"/> Auswirkungen des Klimawandels in politischen Rahmenwerken / climate change impacts in policy frameworks <input checked="" type="checkbox"/> Lernen aus der Vergangenheit / Learning from the past
	Erläuterung / explanatory note	Eine alleinige Betrachtung der gebauten Umgebung reicht freilich nicht aus, um das komplexe System, welches sich um den theoretisch konstruierten Begriff „Resilienz“ aufspannt,

Projekt- und Publikationssteckbrief

Project and publication profile

Lfd. Nr. <i>consecutive No.</i>	Bezeichnung / Erläuterungen / Bibliographische Angaben <i>Designation / Explanations / Bibliographical data</i>	„ESD for 2030: Ethische Fragestellungen, Konflikte und Lösungen im Spannungsfeld zwischen der Bewahrung des kulturellen Erbes und Herausforderung durch den Klimawandel“ <i>Die Welterbe-Büros der Stadt Augsburg, der Stadt Regensburg und der Stadt Regensburg veranstalten gemeinsam 2020/21 eine Veranstaltungsreihe mit nachfolgender Publikation zum Thema „ESD for 2030: Ethische Fragestellungen, Konflikte und Lösungen im Spannungsfeld zwischen der Bewahrung des kulturellen Erbes und Herausforderung durch den Klimawandel“.</i>
	Bearbeitungsjahr <i>Processing year</i>	Ab 2020
	Stichpunkte zu den Inhalten <i>Key points about the contents</i>	Klimawandel, kulturelles Erbe, Lösungsstrategien
	Projektergebnisse <i>/ Project results</i>	<input type="checkbox"/> Website Datensammlung / <i>collection of datas</i> Aufsätze (mit Peer Review) / <i>(peer reviewed) essays</i> <input type="checkbox"/> Sonstige Aufsätze / <i>other essays</i> <input type="checkbox"/> Monographien / <i>monographs</i> x Sonstiges, bitte bezeichnen / <i>Other, please specify</i> <i>Veranstaltungsreihe/Fachlicher Austausch</i> <i>Interkommunales Projekt</i>
	Relevanz für/ <i>relevant for</i>	x Folgen des Klimawandels/Vulnerabilität / <i>Impact of climate change/vulnerability</i> xSchutz- und Anpassungsmaßnahmen / <i>climate impact adaptation / protection</i> xDie Rolle von Kultur- und Naturerbe bei Klimaschutzmaßnahmen / <i>Roles of culture and heritage in transformative change</i> xAuswirkungen des Klimawandels in politischen Rahmenwerken / <i>climate change impacts in policy frameworks</i> <input type="checkbox"/> Lernen aus der Vergangenheit / <i>Learning from the past</i>
	Erläuterung / <i>explanatory note</i>	Alle drei Städte sind als UNESCO-Welterbestätten gefordert, mit ihrem kulturellen Erbe sehr sorgfältig umzugehen. Zahlreiche

Projekt- und Publikationssteckbrief

Project and publication profile

Lfd. Nr. <i>consecutive No.</i>	Bezeichnung / Erläuterungen / Bibliographische Angaben <i>Designation / Explanations / Bibliographical data</i>	Integrating Climate Change with Sustainable Urban Development in the World Heritage Management Plan of the City of Regensburg
	Bearbeitungsjahr <i>Processing year</i>	2020
	Stichpunkte zu den Inhalten <i>Key points about the contents</i>	Klima im Regensburger Welterbe Management Plan, Auswirkungen des Klimawandels
	Projektergebnisse / <i>Project results</i>	<input type="checkbox"/> Website <input type="checkbox"/> Datensammlung / <i>collection of datas</i> Aufsätze (mit Peer Review) / <i>(peer reviewed) essays</i> <input checked="" type="checkbox"/> Sonstige Aufsätze / <i>other essays</i> <input type="checkbox"/> Monographien / <i>monographs</i> <input type="checkbox"/> Sonstiges, bitte bezeichnen / <i>Other, please specify</i>
	Relevanz für/ <i>relevant for</i>	<input checked="" type="checkbox"/> Folgen des Klimawandels/Vulnerabilität / <i>Impact of climate change/vulnerability</i> <input checked="" type="checkbox"/> Schutz- und Anpassungsmaßnahmen / <i>climate impact adaptation / protection</i> <input checked="" type="checkbox"/> Die Rolle von Kultur- und Naturerbe bei Klimaschutzmaßnahmen / <i>Roles of culture and heritage in transformative change</i> <input type="checkbox"/> Auswirkungen des Klimawandels in politischen Rahmenwerken / <i>climate change impacts in policy frameworks</i> <input checked="" type="checkbox"/> Lernen aus der Vergangenheit / <i>Learning from the past</i>
	Erläuterung / explanatory note	

Projekt- und Publikationssteckbrief

Project and publication profile

Lfd. Nr. / <i>consecutive No.</i>	Bezeichnung / Erläuterungen / Bibliographische Angaben / <i>Designation / Explanations / Bibliographical data</i>	<i>EARTH WIND WATER FIRE Environmental Challenges to Urban World Heritage Organization of World Heritage Cities (OWHC) Northwest-European Regional Conference in Regensburg from September 16-18, 2008</i>
	Bearbeitungsjahr / <i>Processing year</i>	2008
	Stichpunkte zu den Inhalten / <i>Key points about the contents</i>	Klimawandel, Bedrohung für Welterbestätten, Anpassungsmaßnahmen
	Projektergebnisse / <i>Project results</i>	<input type="checkbox"/> Website <input type="checkbox"/> Datensammlung / <i>collection of datas</i> <input checked="" type="checkbox"/> Aufsätze (mit Peer Review) / <i>(peer reviewed) essays</i> <input type="checkbox"/> Sonstige Aufsätze / <i>other essays</i> <input type="checkbox"/> Monographien / <i>monographs</i> <input checked="" type="checkbox"/> Sonstiges, bitte bezeichnen / <i>Other, please specify</i> Tagungsband
	Relevanz für / <i>relevant for</i>	<input checked="" type="checkbox"/> Folgen des Klimawandels/Vulnerabilität / <i>Impact of climate change/vulnerability</i> <input checked="" type="checkbox"/> Schutz- und Anpassungsmaßnahmen / <i>climate impact adaptation / protection</i> <input checked="" type="checkbox"/> Die Rolle von Kultur- und Naturerbe bei Klimaschutzmaßnahmen / <i>Roles of culture and heritage in transformative change</i> <input type="checkbox"/> Auswirkungen des Klimawandels in politischen Rahmenwerken / <i>climate change impacts in policy frameworks</i> <input type="checkbox"/> Lernen aus der Vergangenheit / <i>Learning from the past</i>
	Erläuterung / <i>explanatory note</i>	
	(year)	Publikation der Projektergebnisse / <i>Publication of the project results</i>
	Titel / <i>title</i>	From Obstacle to Resource: How Built Cultural Heritage Can Contribute to Resilient Cities
	Darstellung / <i>representation</i>	Aufsatz (mit Peer Review) (peer reviewed) essay <input checked="" type="checkbox"/> Sonstiges / <i>Other</i> : Tagungsband
	Relevanz für / <i>relevant for</i>	<input type="checkbox"/> Folgen des Klimawandels/Vulnerabilität / <i>Impact of climate change/vulnerability</i> <input type="checkbox"/> Schutz- und Anpassungsmaßnahmen / <i>climate impact adaptation / protection</i> <input type="checkbox"/> Die Rolle von Kultur- und Naturerbe bei Klimaschutzmaßnahmen / <i>Roles of culture and heritage in transformative change</i> <input type="checkbox"/> Auswirkungen des Klimawandels in politischen Rahmenwerken / <i>climate change impacts in policy frameworks</i> <input type="checkbox"/> Lernen aus der Vergangenheit / <i>Learning from the past</i>

Projekt- und Publikationssteckbrief

Project and publication profile

Lfd. Nr. <i>consecutive No.</i> 1	Bezeichnung / Erläuterungen / Bibliographische Angaben <i>Designation / Explanations / Bibliographical data</i>	Fachdialog Windkraftanlagen in der Nähe von UNESCO Welterbestätten Kompetenzzentrum Naturschutz und Energiewende (KNE), Berlin 2019
	Bearbeitungsjahr <i>Processing year</i>	2017/18
	Stichpunkte zu den Inhalten <i>Key points about the contents</i>	Ergebnisse des Fachdialogs im Kompetenzzentrum Naturschutz und Energiewende – Dokumentation und Empfehlungen: <ul style="list-style-type: none"> • Kommunikationsstrukturen und Abläufe • Ergänzende Beschreibung des außergewöhnlichen universellen Wertes und der Attribute von Welterbestätten • Gute fachliche Praxis der Visualisierung von Windenergieanlagen* <p>* Zu diesem Thema weiterer Workshop der Windenergie an Land e. V., Landesenergie- und Klimaschutzagentur Mecklenburg-Vorpommern, Kompetenzzentrum Naturschutz- und Energiewende, s.u.</p>
	Projektergebnisse <i>/ Project results</i>	<input type="checkbox"/> Website <input type="checkbox"/> Datensammlung / <i>collection of datas</i> <input type="checkbox"/> Aufsätze (mit Peer Review) / <i>(peer reviewed) essays</i> <input type="checkbox"/> Sonstige Aufsätze / <i>other essays</i> <input checked="" type="checkbox"/> Monographien / <i>monographs</i> <input type="checkbox"/> Sonstiges, bitte bezeichnen / <i>Other, please specify</i>
	Relevanz für/ <i>relevant for</i>	<input type="checkbox"/> Folgen des Klimawandels/Vulnerabilität / <i>Impact of climate change/vulnerability</i> <input checked="" type="checkbox"/> Schutz- und Anpassungsmaßnahmen / <i>climate impact adaptation / protection</i>

Projekt- und Publikationssteckbrief

Project and publication profile

Lfd. Nr. <i>consecutive No.</i>	Bezeichnung / Erläuterungen / Bibliographische Angaben <i>Designation / Explanations / Bibliographical data</i>	Modellhafte Qualifizierung von Energieberatern für Baudenkmale
	Bearbeitungsjahr <i>Processing year</i>	2012-2014
	Stichpunkte zu den Inhalten <i>Key points about the contents</i>	Abschlussbericht über ein Forschungsprojekt gefördert unter dem Aktenzeichen 29802-45 durch die Deutsche Bundesstiftung Umwelt (DBU)
	Projektergebnisse <i>/ Project results</i>	<input type="checkbox"/> Website <input checked="" type="checkbox"/> Datensammlung / <i>collection of datas</i> <input type="checkbox"/> Aufsätze (mit Peer Review) / <i>(peer reviewed) essays</i> <input type="checkbox"/> Sonstige Aufsätze / <i>other essays</i> <input type="checkbox"/> Monographien / <i>monographs</i> <input checked="" type="checkbox"/> Sonstiges, bitte bezeichnen / <i>Other, please specify</i> Förderprogramm KfW-Effizienzhaus Denkmal Qualifizierung und Listung der für das Förderprogramm weitergebildeten Experten DIN EN 16883/2017 Energie Efficiency for historic buildings
	Relevanz für/ <i>relevant for</i>	<input type="checkbox"/> Folgen des Klimawandels/Vulnerabilität / <i>Impact of climate change/vulnerability</i> <input checked="" type="checkbox"/> Schutz- und Anpassungsmaßnahmen / <i>climate impact adaptation / protection</i>

Projekt- und Publikationssteckbrief

Project and publication profile

Lfd. Nr. <i>consecutive No.</i>	Bezeichnung / Erläuterungen / Bibliographische Angaben <i>Designation / Explanations / Bibliographical data</i>	Standards für Energieeffizienz am Baudenkmal
	Bearbeitungsjahr <i>Processing year</i>	2021
	Stichpunkte zu den Inhalten <i>Key points about the contents</i>	Energieeffizienz am Baudenkmal Maßnahmen und Beurteilungskriterien
	Projektergebnisse / <i>Project results</i>	<input type="checkbox"/> Website <input type="checkbox"/> Datensammlung / <i>collection of datas</i> <input type="checkbox"/> Aufsätze (mit Peer Review) / <i>(peer reviewed) essays</i> <input type="checkbox"/> Sonstige Aufsätze / <i>other essays</i> <input type="checkbox"/> Monographien / <i>monographs</i> x Sonstiges, bitte bezeichnen / <i>Other, please specify</i> <i>Publikation, die auch auf der Website des BDA abrufbar sein wird. -</i>
	Relevanz für/ <i>relevant for</i>	<input type="checkbox"/> Folgen des Klimawandels/Vulnerabilität / <i>Impact of climate change/vulnerability</i> x Schutz- und Anpassungsmaßnahmen / <i>climate impact adaptation / protection</i> x Die Rolle von Kultur- und Naturerbe bei Klimaschutzmaßnahmen / <i>Roles of culture and heritage in transformative change</i> <input type="checkbox"/> Auswirkungen des Klimawandels in politischen Rahmenwerken / <i>climate change impacts in policy frameworks</i> x Lernen aus der Vergangenheit / <i>Learning from the past</i>
	Erläuterung / <i>explanatory note</i>	Publikation des Bundesdenkmalamtes – darin wird eine planerische Orientierung zur Vorbereitung und Umsetzung von thermischen Ertüchtigungen, die zum Fortbestand der Nutzung beitragen können und die Erhaltung des baulichen historischen Erbes in Österreich unterstützen, vermittelt. Die Standards für Energieeffizienz am