

Press release

Holzkirchen,
November 10, 2009



Fig.: Linderhof Palace: In view of the increasing utilization of historical buildings in Germany by tourism and all kinds of events as well as by extreme weather conditions due to the global climate change the Fraunhofer IBP investigates the opportunities of an enhanced preservation of this cultural heritage.

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Preservation of the World Cultural Heritage against the Consequences of Climate Change

As the leaders of the world are struggling in Copenhagen to reach an agreement on cutting carbon dioxide emissions, a group of European researchers is starting to assess climate change impacts on cultural heritage. Effects of climate change on ecosystems and on the global economy have been researched intensively during the past decades but almost nothing is known about our cultural heritage. Within the new EU project »Climate for Culture« researchers are investigating climate change impacts on UNESCO World Heritage Sites. The project is coordinated by Fraunhofer Institute for Building Physics IBP and aims at assessing the damage risks for historical sites, as well as developing strategies for long-term preservation and evaluating the economic consequences.

For the first time completely new high resolution climate simulation modeling until 2100 will be coupled with building simulation software adapted for historic buildings. Results are expected to give information on the possible impact of climate change on the built cultural heritage and its indoor environment. The kick-off meeting with around 100 participants from all over Europe took place in one of the finest museums of Germany, the Alte Pinakothek in Munich on November 9, 2009.

Six million tourists visiting the Cathedral of Cologne each year. The Tower of London registers 2.5 million visitors and the Pyramids of Giza list around 4 million. These numbers are rising year by year, but mass tourism at these World Heritage Sites is taking its toll. Stampedes of visitors intensely influence indoor climate: Severe temperature fluctuations and an increase in humidity leave their marks on the historic buildings.

Although these historical monuments are exposed to extensive loads caused by the stampedes of visitors, there are many other factors deteriorating World Heritage Sites. The impacts of climate change are a long-term and substantial

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Press release

November 10, 2009

page 2

menace to the sites. One of the manifold damages caused by climate change is the enhanced weathering of marble and limestone used in many important historic buildings throughout Europe, for example in Westminster Abbey, the Acropolis or the Colosseum in Rome. A further example is the increase of intensified rainfalls in Northern Europe causing damage to delicate building structures of monuments due to both increasing erosion and physical destruction of filigree ornamental elements.

How can we avoid climate induced damages at historical buildings which are non renewable resources? Will we be able to save our world cultural heritage and what will be the costs to safeguard the tangible memory of mankind? Which measures will have a long-term success and are reasonable from the economic point of view? These and other problems are investigated at present by a multidisciplinary team of researchers within the framework of the EU project »Climate for Culture«, which was recently started and for the first time examines several aspects of the climatic impacts, visitors, climatisation (indoor climate) and climate change (outdoor climate).

EU funding for this first large-scale integrating research project amounts to 5 Mio. €. All in all, 27 partners from 16 European and North African countries cooperate in this project among them are the Fraunhofer Institutes for Building Physics, Silicate Research as well as the Fraunhofer Center for Central and Eastern Europe. Further renowned partners are the Max-Planck-Institute for Meteorology, the Centre for Documentation of Cultural and Natural Heritage in Egypt and the London School of Economics. Project coordinator is Fraunhofer.

Within a period of five years, the impacts of climate change on a large selection of historic buildings including famous UNESCO World Heritage Sites in Europe and North Africa are investigated. Among them are the historic city centers of Wismar and Stralsund on the Baltic Sea, Venice which is menaced by sea level rise, the Schönbrunn Palace in Vienna and the Pyramids of Saqqara in Egypt. »The target of our investigations is not only a precise and integrated assessment of the real damage of the cultural heritage caused by the impact of climate change, but also the development and im-

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Press release

November 10, 2009

page 3

plementation of sustainable and preventive strategies for conservation«, explains the project coordinator Dr. Johanna Leissner.

The researchers develop new climate simulation models which allow the assessment of regional impacts of climate change. These models are coupled with hygrothermal building simulation software especially adapted for historic buildings. Thus preventive conservation strategies will be tailored to the requirements of the respective World Heritage Site even at an early stage.

The researchers of Fraunhofer also examine the Bavarian Palaces and Castles of Ludwig II., e. g. the Linderhof Palace and the King's House on the Schachen. In a second step concepts will be developed to preserve these precious historic buildings and their interiors and works of art at an early stage.

»The Bavarian Palaces and Castles were not built to be visited by thousands of tourists every day«, explains Ralf Kilian of Fraunhofer IBP. The stampedes of visitors cause much humidity which may result in mould growth. The problems will still aggravate in the years to come: If temperatures rise due to climate change, more humidity will infiltrate the buildings. Innovative and energy saving solutions have to be developed to preserve the historic buildings as well as works of art.

Further information please find here:
www.fraunhofer.de/veranstaltungen-messen/20091109_Climate_for_Culture.jsp

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Press release

November 10, 2009

page 4

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