

CHEF (Cultural Heritage Protection Against Flooding)

Project's website:

www.chef.bam.de

1. Problems to be solved:

The European Community has suffered from disastrous floods in recent years, which caused enormous damage and left hundreds of peoples dead in several European countries. The flooding occurred across regional borders and involved neighbouring states along the rivers



Historic Powerstation in Prague, flooded during 2002 Vltava flood. (Photo: V. Herle)

Elbe (2002), Odra (1997), Rhine (1993 and 1995) and many more. The economic losses were extremely high and affected not only local regions but also the whole European Community. Europe has to face further flood catastrophes due to the change of climate and due to further building activities in flood-prone regions. As one prerequisite to minimize costs for rehabilitation, there is an urgent need for protecting the common European moveable and immoveable Cultural Heritage against flood and other environmental hazards and the threatening conditions resulting

from this. These services should include monitoring and supervising of drying and repairs as well as a comprehensive damage assessment. According to Article 7 of the new DIRECTIVE 2007/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2007 on the assessment and management of flood risks, guidelines and recommendations for strategies for prevention and mitigation of damage of Cultural Heritage against flood will be developed to be included in flood risk management plans.

2. Scientific Objectives and Approach (including innovation):

CHEF proposes the integration of multidisciplinary research as scientific support to European policies. In this frame cost efficient and effective tools for the development of new and innovative strategies will be provided. For avoiding or mitigating flood-related damage of Cultural Heritage, a multitude of aspects has to be considered, like historic significance and context of the object, building structure and its location in risk areas. But also technical problems like lack of documentation, unspecified structural condition and assembly, unknown material characteristics and parameters of exposure require intense investigations.

The research will be carried out through interacting work packages, which will provide a clear progress beyond the current state of the art:

WP1: Identification of typical environmental hazards related to flood and being decisive to Cultural Heritage. Here, flood mechanisms and hydrology will be one important aspect. Moveable and immovable Cultural Heritage will be classified according to its sensitivity.

WP2: Damage analysis of different materials and moveable Cultural Heritage, their properties and their interaction with moisture, salt, pollution and other phenomena related to flooding catastrophes. Survey of possible flood-related damage, validation of NDT- and MDT-methods for damage detection, classification and definition of damage threshold will be given.



CHEF partners during 2nd project meeting at Pillnitz Castle / Dresden. The high water during 2002 Elbe flood almost reached the balcony.

WP3: Classification of damage on historic structures and sites including buildings, infrastructure (e. g. bridges) and cities for understanding the mechanisms of static and dynamic loading, moisture and salt transport, contamination and erosion problems as well as the vulnerability of whole structures and sites.

WP4: Analysis of preventive and emergency measures (administrative and technical) and of restoration and repair techniques for materials, movable heritage, structures and sites. Conclusions from previous floods and

measures will be drawn related to the development of new and innovative technologies.

WP5: Running and new case studies on different objects will be investigated with regards to a multitude of aspects. Full-scale models in the shape of small buildings will also be used as intermediate case between laboratory and real buildings.

WP6: Development of guidelines and recommendations for the strategies for an assessment of vulnerability of Cultural Heritage against flood, the prevention and mitigation of damage, the emergency and the medium and long term post-flooding action plans.

3. Achieved Scientific Results:

Among other outcomes of the first project period, two results are highlighted here:

Report on experiences from previous and historic floods, summary about the characteristic parameters that may have influence on the threat to Cultural Heritage. Flood characteristics are brought into context with Cultural Heritage protection (both movable and immovable) and those characteristics are sought that may help in developing better mitigation strategies in highly vulnerable sites.

Interfaces to running Flood & Cultural Heritage Projects facilitate synergetic exploitation of results and co-ordination with other European activities related to mitigation damage from floods.

4. Policy Impact:

Protection against flood-catastrophes aims at the people in the first place, but also at nature, economical goods and the built environment within cities and villages. Residential buildings, factories, offices could be relocated; damaged buildings might be rebuilt in different places in non-risk areas. Cultural Heritage is often bounded to certain locations, environments or

landscapes and bears its value in its historic context. Measures for flood protection have to be settled rather in prevention, repair and maintenance.

The strategies developed in the project can help to make protection and repair of Cultural Heritage against flood and related hazards far more effective and allow to carry out these measures on a large scale.

With a reasonable management of Cultural Heritage sites, whole neighbourhoods can be prevented from deterioration. Another aspect is the understanding of damage processes not only induced by flood but also by other aggressive environmental conditions, such as air pollution, microclimate, earthquakes, traffic vibrations, etc. This knowledge will help to take precautions against it and will thus reduce the impact environmental damage on historic structures.

5. Dissemination and Exploitation of the Results: spin-offs, publications, database operational at the end of the project, patent etc.:

A dissemination plan has been set up including conferences, publications, identification of exploitable products (guidelines & recommendations).

During the 2nd project meeting in Dresden in September 2007, a public workshop was organised. Members from the user-group were invited and presentations from the partners and the user-group were given related to the following topics:

- Flooding – A Global Phenomenon
- Cultural Heritage – Threats, Dangers, Help
- Assessment, Diagnosis, Treatments
- Presentations from CHEF project

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¹ Cost-shared research (or STREP), Accompanying Measure (or SSA), Concerted Action, Thematic Network.

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