

Environmental Hazards in Cultural Heritage - Development of Knowledge Base for Effective Western Balkan Protection Strategy

In recent years, the countries of the Western Balkan have shared serious adverse changes in ambient conditions. Namely the countries have suffered an increase in temperatures, UV radiation, fluctuations of temperature and humidity, increased hours of sunshine, wind, rainfall and cyclic wetting and drying) and disastrous floods. The changes occurred across regional borders and included neighboring states from Slovenia to Serbia (along the river Sava), from Hungary, Croatia and Romania (the Danube and the Tisa), Adriatic coast (Montenegro Croatia and Albania), Ohrid lake (Macedonia and Albania) and Skadarsko lake (Albania and Montenegro). These changes caused enormous damage in built environment and there is still not enough knowledge for adopting the common strategy and policies in prediction, prevention and restoration of the cultural heritage.

Besides economic losses which are extremely high, the immovable Cultural Heritage/architectural heritage in the broader region has also suffered serious damages.

As the floods cannot be prevented, the Balkan will have to face further accidents due to the change of climate.

Taking into account the research data and experience in different fields of investigations of the project participating countries it could be concluded that there is still a serious lack of relevant data and documentation on material characteristics and building structural elements of architectural heritage as well as a lack of equipment for *in situ* characterization. This could be used in multidisciplinary research of prevention, mitigating and repairing damages caused by climate changes and specially floods.

The innovative aspect of the research is based on the fact that the approach is interdisciplinary incorporating the teams of architects, material, social and natural scientists. With interdisciplinary and multidisciplinary insight into the complex problem, the methodology, methods and techniques will be considerably improved.

The focus of the research aspect will be environmental monitoring both indoor and outdoor: dust, noise, temperature, humidity, irradiation, sensors for groundwater table, sensors for capillary water, structural assessment using advanced radar and ultrasound techniques, wireless technology, the latest cultural heritage diagnostic technologies and innovated approach comparing to the existing practice (the regions are not connected and there is not any center of excellence in the field of culture heritage).

The objectives of the proposed project are:

- to explore strategies to build the regional network and a database on the immovable cultural heritage classified according to its sensitivity to climate changes and flood exposure along the most sensitive river corridors;
- to review existing protocols, methodology and best practices in Western Balkan Countries concerning the risk assessment and prevention measures in the field,

- to improve and develop non-destructive techniques and methods for detection of types and mechanisms of damages on specific structures and materials caused by chemical, physical and biological effects,
- to develop strategies for both prevention and reparations in the case of defined action type.

Focusing on the research, it is expected to obtain new results in the fields of architecture, building materials and related natural and social sciences coupled with new knowledge (processes and mechanisms of building degradations) towards defining scientific approach considering prevention, protection and restoration of culture heritage as valuable part of the regional environment.

These sub-activities address multidisciplinary research contributing to the conservation and safeguarding of cultural heritage. They include the need to respond to the challenges resulting from the changes of our natural environment as well as from man-made activities and focusing on damage assessment and preventive conservation of the cultural heritage.

The major goal of the project is the initiation of an effective interdisciplinary collaboration for the development of interregional approach and strategy for the cultural/architectural heritage protection based on the knowledge and information of risk hazards of climate changes. Besides the contribution to cultural heritage protection, these activities will contribute to further building activities in flood-prone regions.

The transnational and cross-border dimension of the proposal is self-evident in the fact that the concept of the proposed research is based on the geographical, historical and environmental similarities and differences of the Balkan regions taking into account the overlapping of some specific sub regions (Panning region, river corridors, and mountain area) and their specific eco systems.

The experience of all the participating countries and the results in the research field should be coupled in integrated cross-border cooperation with the expecting synergetic effect in the research program of multilateral interest and benefit.