

New safeguarding strategies for outdoor CH facing Climate Change

Cristina Chiavari, Elena Bernardi, Carla Martini

*University of Bologna, Department of Cultural Heritage,
Via degli Ariani, 1 - 48121 Ravenna - Italy,
E-mail: cristina.chiavari@unibo.it*

Outdoor Cultural Heritage (CH) is susceptible to degradation processes due to the interaction among physical, chemical and biological factors, especially in polluted environments. Furthermore, climate change is exerting an influence on these mechanisms of decay. The evolution in the utilisation of energy sources and in the management of environmental resources, guided by legislation and regulations, has a significant impact on the preservation of outdoor CH. These challenging issues are developing within a context of great interest and urgency, as suggested by the EU-CH Green Paper, entitled "Putting Europe's shared heritage at the heart of the European Green Deal".

It is evident that the global decline in SO₂ concentrations, the relative enrichment of NO_x, O₃ and PM, and more generally, the local variations in terms of multi-pollutants, in conjunction with the effects of climate change, are engendering increasingly aggressive scenarios affecting the mechanisms of decay of CH materials, ranging from stones to metals. Despite the paucity of research in this area, it is evident that these aggressive scenarios have a detrimental effect on the life of bacteria communities, which play a fundamental role in the conservation of cultural heritage materials.

In light of the evolving environmental context, the preservation and maintenance of CH represent a significant challenge. In the domain of cultural heritage preservation, the development of sustainable and efficient protection strategies is imperative. Tailored formulations, based on advanced and eco-friendly treatments (coatings), are currently under investigation. These formulations require rigorous testing in a laboratory setting, where they can be subjected to conditions that more accurately replicate the complex outdoor system, characterised by the significant interplay of chemical, biological and physical parameters. The conception of an intelligent and sustainable protective strategy must encompass numerous factors in addition to efficacy, including toxicity and environmental impact (for instance, the LCA approach) and the alignment with the principles of the circular economy.

The presentation will focus on the latest advancements in the field.