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# Sharing experiences in the sustainable management of cultural and natural heritage at risk under climate change scenario: the INACO Project

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Over recent decades, managers and curators of cultural heritage sites have faced unprecedented challenges in safeguarding cultural and natural heritage (CNH). Archaeological sites, historic parks and gardens, monumental complexes, historic buildings and related collections, cultural landscapes and natural reserves are increasingly vulnerable to the adverse impact of both slow-onset and extreme climate events, alongside anthropogenic pressure. This contribution presents two innovative tools developed within the Interreg Central Europe Project INACO (https://www.interreg-central.eu/projects/inaco/): (i) a "Risk Mapping Tool for Cultural Heritage Protection" to allow accessing and exploiting climate-related indicators, and (ii)CNH-Care, a specialised application designed for assessing the vulnerability of CNH sites exposed to climate extremes. Both tools are web-based and adopt a user-driven, multidisciplinary approach that fosters collaboration among the scientific community, public authorities, and the private sector. These tools provide knowledge and solutions to support policy and decision makers, curators and cultural heritage managers in the identification of hazard-prone areas and the evaluation of the vulnerabilities at the local scale. The INACO tools enable assessing the risk of cultural heritage assets based on:

- identification of climate and pollution parameters with priority in causing impacts on cultural heritage;
- computing extreme changes in precipitation and temperature using climate extreme indices;
- hazard analysis by exploiting Copernicus satellite services CAMS (Atmosphere Monitoring) and C3S (Climate Change), and other Earth Observation-based data and products;
- development of projections of hazard at territorial level by using outputs from Global/Regional Climate Models from the Euro-CORDEX experiment in the near (2021-2050) and far (2071-2100) future, under two different IPCC scenarios, stabilising (RCP4.5) and pessimistic (RCP8.5);
- vulnerability assessment of cultural and natural heritage with the evaluation of the physical and socio-economic dimensions of vulnerability;

The INACO tools have been tested in selected European case studies for different types of cultural and natural heritage assets and in three different environmental contexts linked to European river basin districts: sea/river shore, lake shore, and inland river shore. The testing results confirm the feasibility and effectiveness of these tools in optimising preparedness strategies and mitigating climate-related risk. The ultimate goal is to empower stakeholders and policymakers to integrate dedicated heritage protection measures into national disaster risk reduction and climate adaptation plans, while fostering the active participation of local communities.

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