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How to scientifically assess a restoration project: a case study

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Commonly, it is said that there is lack of communication among scientists, conservators, restorers, project managers and architects. But sometimes this communication flows, and we can find enormous benefits from and for all the participating agents. This is the case we present in this work, in which technical agents in charge of the restoration of a building, asked for some scientific advice to perform the restoration of a heritage building.
The results were successful and fantastic for both of them, in terms of one part asking for consultation and the other answering to the demands and resolving real problems.
This is the case of a marvellous Renaissance building (Medinaceli Dukes palace, 15th-16th centuries) in the central area of Spain (Cogolludo, Guadalajara).
Focused on the restoration project, we were asked for consultancy on how to solve matters like the assessment of the already fixed in project cleaning method for the stone façades, the efficacy and durability methods for some conservation products to be applied, the presence or not of a patina on the stone; the viability of using some restoration mortars, and the origin of some efflorescences that came out just after placed in the building a restoration rendering mortar.
Responses to these matters were answered by performing tests both in the lab and on site in the building. The efficiency and effects on stone of the blasting cleaning method was assessed by first analysing the nature and thickness of the surface deposits to be removed (SEM-EDS analyses); secondly, roughness and colour measurements were performed, and thirdly, SEM-EDS analyses were carried out again to determine whether the cleaning method was able to remove part of the surface deposits, completely, or even part of the stone substrate.
Some conservation products were tested on stone specimens, both their efficacy and their durability, concluding that it was better not to apply any of them.
A patina was found on the stone façade under SEM, probably applied for colouring and homogenizing purpose, and below it and on the stone, an acrylic film was analysed. It was in good state, and its removal could be worse and more dangerous to the substrate than leaving it.
Two restoration mortars were tested to characterize them and to determine their durability, the results showing that one of them was much better than the other.
Finally, a restoration render was analysed and we found, by analysing it and the raw materials used for its preparation, that one of them, a marketed cement, had a very high content on sulfates, responsible for the efflorescences (sulphate compounds) that appeared just after the render was placed in the building, this resulting on stopping using this product in the restoration project.
Consequently, conservation science should be considered as not only useful but essential for cultural heritage conservation, besides it is cost-saving, because failed interventions are much more expensive in the short, medium and long term.