



## Return to basics—Environmental management for museum collections and historic houses



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### ABSTRACT

Over the last few decades, research on the impact of environment on the cultural heritage and material response to processes of deterioration and at the same time introduction of risk-based methodology in developing preservation strategies lead to the revision of the guidelines for environmental management in the field of conservation of cultural heritage.

Following this approach and taking into account minimal risks to collections Central Institute for Conservation in Belgrade has been working with museums in Serbia on determining the necessary environmental requirements for a specific collection and proposing adequate control strategies. The recommendations based on surveys of facilities and collections and monitoring of indoor environmental parameters, focus on eliminating sources of extreme conditions, and improving the existing conditions, or even maintaining the existing conditions when they are observed as stable both for collections and building. This strategy favors solutions which do not affect the building as a historical monument or its integrity or impose excessive investments in museum building. The paper will present issues and solutions for preservation of museum collections set in historic buildings, through several case studies and from the position of conservators, based on gathered data on collections, building and risks to collections.

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### 1. Introduction

In the last ten years Center for Preventive Conservation *Diana*, first as a part of the National Museum, now in the Central Institute for Conservation, has been advising museums and heritage institutions in Serbia on strategies for control of the environment in the context of preventive conservation for collections. We usually deal with museums or private collections in historic buildings. The most often issue raised by museum is the level of relative humidity and request for recommendation for acquiring climate control equipment (humidifiers and/or dehumidifiers or air-conditioning units). With a team consisting of a curator, conservators, architects and on times mechanical engineer, through observation of facilities, state of collections, history of conservation conditions in which the collections were kept, consulting old documentation and projects, interviewing the staff on observed changes in climate conditions and on objects, as well as gathering data through current or

continuous monitoring of relative humidity, temperature, light and particulates pollution, we are able to determine the necessary environmental control requirements for a specific collection or a museum. The data gathered through surveys and monitoring are compared to the set of indicators for adequate preventive conservation of museum collections and processed, in terms of risks to the objects. Monitoring shows if there are extreme conditions, when they occur, in which part of the building and to what extent the building is effective in providing the stable climate conditions and buffering the outside extremes. The proposed solutions are directed toward eliminating sources of excess relative humidity and intervening on the building at the level of openings, existing heating systems and natural ventilation. Often, recommendations are made not to change the existing climate conditions, since they do not, even if unmaintained at the certain level, endanger the collections or the building itself.

Our work is a demonstration of successful collaboration of an interdisciplinary team and the importance of conservators input when making decisions on environmental management, taking into account the results of the latest scientific research on material response to changes of environmental parameters, as well as minimal risk to collections and the building. That approach is also

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in accordance and direct consequence of lack of resources and investments in museum buildings.

## 2. Background information on current trends in environmental control in historic objects and museums

Understanding the importance of environmental impact on cultural heritage, during 20th century, led to publishing of large number of publications, dealing with “safe” levels of relative humidity, temperature and light, as well as concentration of pollutants, which were considered adequate and without risk of inducing damage to museum collections and collections in historic houses [1–3]. Very narrow specifications for objects, together with the need to respect human comfort in public institutions, such as museums, implied the necessity of installing heating, ventilation and air-conditioning systems and retrofitting of the buildings, often not taking into account the effect this would have on the building itself and collections. However, as a result of scientific research in conservation related to material behavior and mechanisms of deterioration due to effects of the environment, the proposed specific appropriate levels for environmental conditions were in past several decades under scrutiny. Furthermore, in the context of raising awareness on effects of climate change, global responsibility and the need to develop and implement sustainable strategies, as a response to the need for responsible planning and management, preservation and use of collections, there is a shift in developing guidelines for environmental management in the field of conservation of cultural heritage. The shift from prescriptive to evidence-led guidelines coalesces with the introduction of the concept of acceptable change and loss to the objects and its influence on object or collection significance and risk based approach in making decision in conservation management [4].

This is reflected in a new chapter of ASHRAE Manual dedicated to the museums, galleries, archives and libraries, where, instead of rigid values for relative humidity and temperature, four categories for climate control were suggested [5–7], based on acceptable ranges of relative humidity and temperature and taking into account existing risks to which materials are exposed. Additionally, section on the pollution control presented the approach based on the concept of dose (the concentration of the pollutant multiplied by the duration of exposure) and option to determine an acceptable rate of deterioration due to pollutants depending on cost–benefit analysis [8,9].

Correspondingly, new climate guidelines for Dutch cultural heritage institutions, guidelines set by National Museum Directors’ Council in 2009 for collections and finally a technical standard PAS 198:2012 Specification for managing environmental conditions for cultural collections, published by BSI in 2012, represent a response to a demand for the change of approach in the environmental control for collections [10–13]. The proposed guidelines are based on the integrated approach to environmental management taking into consideration different categories of objects, conditions in which they were kept and their specific needs and sensitivity, their use, relations of both movable and immovable heritage. The approach implies including information on significance of the building and the collections and the results of assessment of environmental risks to materials into decision-making process, allowing an acceptable degree of loss or deterioration. Finally, the guidelines take into account the limitations imposed by the need to reduce costs of energy.

In practice, the shift toward evidence-led approach and reducing energy cost in developing preservation solutions is reflected in the development of ultra-low-energy museum storage and strategic equipment shutdowns [14–16].

## 3. Environmental monitoring and surveys in Serbian heritage institutions

As a central institution for conservation of cultural heritage, Central Institute for Conservation in Belgrade is in a position to influence and to contribute to the development and implementation of solutions for environmental management in cultural heritage institutions in Serbia. In the context of the developing country, lack of investments in preservation of cultural heritage and due to the global economic situation in the country we are forced to seek cost effective solutions which coincide with current trends in planning environmental control in historic objects and museums.

Out of around 140 museums in Serbia only four building were purposefully built for museums in seventies, with the central systems for environmental control outdated or never activated. Therefore, (un)fortunately, we currently do not have a single museum using HVAC (active temperature, relative humidity and pollution control), due to high installation and running costs.

The museums and historic collections are situated in unmaintained buildings, built in the period from the end of the 19th century to the beginning of the Second World War, as private houses or official buildings and the most often never fully adapted to the needs of preservation of collections. In most cases, as once public spaces were refurbished for exhibition and offices, the collections were stored in cellars and attics, or spaces without sufficient thermal and hydro insulation, with low thermal inertia and high air exchange rate due to the lack of airtight building openings.

The climate of Serbia is moderately continental, with localized variations (the southwestern regions border the subtropical and continental climate zones) and a gradual change between the seasons [17]. Past decade saw more and more abrupt change of seasons, as well as increase of number of dry periods followed by short and heavy precipitation events.

In the past decade many museums recognized the importance of maintaining adequate conditions for collections and there are strong initiatives to invest into improving environmental control. However, tendencies are toward traditional approach in maintaining specific strict levels on environmental parameters, which requires active control with its cumbersome, energy devouring installations. Central Institute for Conservation insists on the approach that different situations call for different solutions and insists on systematic gathering of data to support the decisions being made.

### 3.1. Data collecting and processing – the approach

Surveys, conducted by Central Institute for Conservation, include visual observations of building and collections, interviews with staff and gathering existing records and data collecting on external and internal environment of collections. As a part of every survey we introduced the use of portable devices for measuring relative humidity, temperature, humidity content in the walls, wall temperature, light levels and concentration of particle pollution. The impact of these factors on collections is usually slow and difficult to detect, but their effect is cumulative and important for life expectancy of cultural heritage objects. Additionally, inappropriate levels of relative humidity or light can damage highly sensitive objects very quickly.

Initial information on history of building and collections, including reconstructions and installations, as well as damages to the objects due to environmental changes, in conjunction with climate, light and pollution records enable us to make an assessment of environment in spaces and risks to collections. It also allows us to determine the effects of outside conditions on the indoor environment, behavior of the building in terms of thermal insulation and

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