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Heritage and Climate Changes in Romania: The St. Nicholas Church of Densus, from Degradation to Restoration

Mihaela Stela Georgescu[a]*, Cristina Victoria Ochinciuc[b], Emil Sever Georgescu[c], Iolanda Colda[d]

[a]*University of Architecture and Urbanism "Ion Mincu", 18-20 Academiei Street, 010014 Bucharest, Romania*
[b]*University of Architecture and Urbanism "Ion Mincu", 18-20 Academiei Street, 010014 Bucharest, Romania*
[c]*National Research and Development Institute URBAN-INCERC, Sos. Pantelimon No. 266, 021652 Bucharest, Romania*
[d]*Technical University of Civil Engineering, Bd. Pache Protopopescu, No. 66, 021414 Bucharest, Romania*

Abstract

The paper present the restoration of Densus Church, Hunedoara County, Romania, initiated more than a decade ago, in view of actual situation and research needs. The investigation with infrared (I-R) thermography was associated with measurements of air temperature and relative humidity. The high humidity inside the church was the main risk factor for degradation of frescoes, since moisture was coming from capillary rise of water. The natural ventilation was improved after restoration, while the insertion of a floor heating and the perimeter drainage in building and surrounding area prevented humidity increase.

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Keywords: building structures; natural ventilation; infrared thermography; humidity; restoration.

1. Introduction

The St. Nicholas Church of Densus, Hunedoara County, in the historical Romanian Province of Transylvania, is a particularly interesting historical monument and architectural heritage in Romania. Since 1991, the church was

* Corresponding author. Tel.: +0040-745-058-815; fax: +0040-213-077-105.
*E-mail address:*mihaelastela.georgescu@yahoo.com

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proposed to be included on UNESCO list of heritage. The construction period is most likely the thirteenth century; the church was modified successively during the XIVth and XVth centuries. The building passed through many patterns of use and decay under changing interior / exterior climates. Since the relationship with the local environment factors was addressed only when some restoration was done, we consider appropriate to evaluate the past and future exposure of this monument.

The CLIMAMED 2017 is focused on a series of correlated heritage issues that cannot be treated separately. Indeed, the retrofit of historical and existing buildings and energy retrofit seems to be not compatible, but there are so many monuments in daily use that need such solutions, at lest partially. In reality the users need heating and air-conditioning installations, need a better indoor air quality, for thermal comfort, accept passive heating and cooling elements and try to use energy from renewable sources. The choices in the analysis are clearly different, while the management and monitoring, as well as the development and endorsement of regulatory standards are difficult. As heritage, the need of non-invasive techniques is a must.

Such issues can be better related in order to have an integrated view on climate change consequences, from macro-scale (global-regional) to national or zonal – urban and micro-scale (building), with emphasis on heritage buildings. By chance, some areas located in the West of Romania (Banat) have climatic conditions with patterns that are closer to Mediterranean conditions. Therefore, the approaches of the professionals concerned with Mediterranean culture and civilizations can be of interest for Romanian researchers too.

It is significant that EU has funded the project "Climate for Culture", from 2009 to 2014, with 27 partners from all over Europe (+ Egypt) to investigate the impact of climate change on UNESCO World Heritage Sites in a project, coordinated by the Fraunhofer Institute for Building Physics (IBP) [1]. Besides the risk of damage to historical sites and to the collections they contain, the issue is to develop strategies for long-term preservation and evaluate economic consequences.

The context of the global climate changes represent also a historical approach challenge for this monument-church of Romania, since its materials come from a period of late Roman antiquity, being taken from Ulpia Traiana Sarmizegetusa - former capital of the Roman Province of Dacia.

The climate during the Roman Empire and after its fall, represent an object of study with other purposes [2], yet of interest for this case study. The authors used a very complex bulk of approaches, direct and proxy data, to derive a synthetic view of climatic conditions during nine centuries across Western Eurasia.

They identified signs of hydroclimatic difficulties multiplied in the Eastern Empire during the sixth and seventh centuries. As an assumption, authors claim that such climate conditions coincide with, and probably help to explain, the initial early expansion of the Roman Empire and the later success of the eastern Roman Empire while its western counterpart declined. Thus, the climate change was directly influential on civilizations evolution, as it is re-discovered nowadays.

It is a common knowledge that the Roman settlements in this part of Dacia Felix, the core of present Romania, where Densus Church is located were built since the II-nd century AD, and left in situ after retreat of Roman Imperial administration in the and III-rd century AD. The Roman type temples and buildings were gradually destroyed by invaders, earthquakes, decay, looting and dismantling. After a period of quite a millennium of laying in the environment conditions of the post-Roman Dacia, they were used in this new building in an unusual manner.

After being built in XIIIth century, the Densus Church was likely to endure the climate of the "Little Ice Age" [3,4], the period of cooling, that was conventionally defined as a period extending from the 14th to the 19th centuries. Although there are any local data on climate changes until the XXth century around the Densus Church, it was resistant enough to withstand and be used for religious service.

What concerns the contemporary climate changes on Romanian territory, as well as the occurrence of local peaks of temperature (urban heat islands), they represent an object of recent public policies and research projects [5]. The National Strategy for Climate Change in Romania was approved in July 2013, as it is cited in the Romanian Ministry of Environment and Climate Change Report, and refers to the effects of climate change on all natural and built environment [6]. Heritage is not mentioned but it is likely to undergo the same impact, yet with more strict coping requirements. The cited Report includes significant warnings on the following facts and trends:

- Romanian meteorological data from 1961 to 2012 highlighted significant changes in the temperature regimes in all seasons. Thus, upward trends in temperature are statistically significant over almost all territory in spring