3 The Neolithic in the Middle Morava Valley

Editor: Slaviša PERIĆ

INSTITUTE OF ARCHAEOLOGY, Belgrade
REGIONAL MUSEUM, Paraćin

The Neolithic in the Middle Morava Valley

No 3

Editor: Slaviša PERIĆ

ISSN 1820-4724
ISBN 978-86-6439-053-8

The Neolithic in the Middle Morava Valley:

Interdisciplinary contributions to research and preservation of archaeological heritage

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Belgrade, 2019.

Publishers:
Institute of Archaeology, Knez Mihailova 35/IV, Belgrade
Regional museum Paraćin, Tome Živanovića 17, Paraćin

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Graphic design by: Danijela Paracki

Printed by: BIROGRAF COMP d.o.o., Belgrade

Circulation: 500 copies

This monograph is published thanks to the financial support of
the Ministry of Culture and Information of the Republic of Serbia.

The monograph is a result of scientific project OI 177020 – *Archeology of Serbia: cultural identity, integratian factors, tehnological processes and the role of the Central Balkans in the development of European prehistory.*

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by Natalija ĆOSIĆ and Slaviša PERIĆ

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Пример неолитског налазишта Слатина–Турска чесма
у Дреновцу код Параћина
Наталија ЋОСИЋ и Славиша ПЕРИЋ

In memoriam Radovan Petrović

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Problems and challenges in the management of prehistoric sites. Example of the Neolithic site Slatina – Turska česma in Drenovac near Paraćin[1]

Abstract:

Archaeological heritage is a complex concept that exceeds simple materiality. It comprises movable and immovable remains, the evidential and interpretative notion of material traces from the past as well. At the same time, archaeological heritage is a fragile and non-renewable scientific, cultural, and societal resource. Its use must, therefore, be systematically planned and managed to minimize the devastation the kinds of values that physical remains can convey. This paper describes the establishment of an integrated conservation management program for the Neolithic site of Slatina – Turska česma in Drenovac, near Paraćin, in parallel with the ongoing archaeological excavations. Also, this is an attempt at a reflexive, critical review of the realized activities and the implications of sheltering the archaeological site. The aim is to evaluate the current preliminary results and to show what the next steps will be.

Keywords: archaeological heritage, management, prehistoric sites, monitoring, conservation, preventive conservation, Neolithic site, Slatina – Turska česma in Drenovac

Introduction

In general, most protection policies, charters, laws, and conventions define “archaeological heritage” as a part of the material heritage. This comprises different physical records relating to manifestations of human and animal activity and remains of various kinds from the past. The definition applies equally to objects as small as glass beads, as well as for in-situ structures or an entire archaeological site[2].

However, archaeological heritage is a more complex concept that exceeds sheer materiality. It comprises movable and immovable remains, and the evidential and interpretative notion of material traces from the past as well. As Robin Skeates states, archaeological heritage can be defined in two general ways. First, as material cultural traces from past communities that survive in the present, and second as the process through which the material culture of past societies is re-evaluated and reused in the present[3]. Similarly, Criado describes an archaeological record as having a complex and plural nature. According to him, archaeological remains have a dual reality.

1 This paper is a result of research on the project no. 177020 Ministry of Education, Science and Technological Development of the Republic of Serbia. Geophysical surveys and archaeological excavations were funded by the Ministry of Culture and Information of the Republic of Serbia.

2 Charter for the protection and management of the archaeological heritage, Lausanne 1990; European Convention on the Protection of the Archaeological Heritage, Valetta, 1992.

3 Skeates 2000, 9–10.

On the one hand, they are a document of a past society and raw materials, and on the other, they are physical remnants and intellectual entities. As he puts it: "a thing and a concept, an object, and representation"[4].

At the same time, archaeological heritage is a fragile and non-renewable scientific, cultural, and societal resource. Meaning that every action and decision made influences how we discover, preserve, and present the past[5]. Its use must, therefore, be systematically planned and managed to minimize the devastation of all the values that physical remains can convey. To create a sustainable decision-making process that is in line with ever changing heritage, there is a need to acknowledge the social aspects of cultural significance. That is, as a sum of its values, the significance is not something inherent that only experts can recognize and value, rather it is a construct shaped by many interested parties[6]. In terms of archaeological site management, this is the central point. Understanding the multiplicity of values is an essential driving force for creating a long-term archaeological site plan.

That said, this paper deals with the problems and challenges in the management of prehistoric sites, particularly for the Neolithic site of Slatina – Turska česma in Drenovac, near Paraćin. The paper describes the introduction of an integrated conservation management program for this prehistoric site. The integrated management conservation program for this case study, in its essence, is built on the theoretical and methodological principles of preventive conservation. Also, this paper is an attempt at reflexivity, a critical review of the realized activities and the implications of sheltering the archaeological site, based on 1) heritage values and 2) conservation management capacity. The aim is to evaluate the current preliminary results and to show what the next steps will be.

Contextualization of the Neolithic site of Slatina and the archaeological project

The Neolithic site of Slatina – Turska česma in Drenovac, near Paraćin appeared in archaeological literature at the end of the 1960s. That was the period of the first major archaeological excavations at this site. On this occasion, 14 probes were surveyed in two locations, covering a total area of about 290 m². Unfortunately, to date, there has been no systematization of the research outcomes from this period or any publication of the consolidated results[7]. The site was revived in 2004, when a resumption of the excavations started within the project: *Permanent Archaeological Workshop – Middle Pomoravlje in the neolithization of Southeast Europe*. The Archaeological Institute is the project coordinator in cooperation with the Regional Museum in Paraćin and the Regional Museum in Jagodina. The archaeological excavations and geophysical research that followed after 2006 showed that in Drenovac there is a multilayered Neolithic site, whose findings spread over an area of between 50 and 60 ha[8]. The oldest layers belong to the older Neolithic settlement of the Starčevo culture, with material that corresponds, in a cultural and chronological sense, with the material of the older Neolithic phase on Velesnica, Divostin, Grivac, Banja and Blagotin[9]. These situations demonstrate the presence of a group of the earliest agricultural communities of the Central Balkans. Furthermore, a younger Neolithic settlement, with at least four levels of houses, chronologically covers almost the entire developmental period of the Vinča culture. In total, contemporary research has shown that the area of the central Pomoravlje contains 84 Neolithic settlements. This specific position and context gave the Neolithic site in Drenovac a unique value on the archaeological and cultural horizon.

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4 Criado-Boado 2001, 131–132.
5 sf. Smith 2006.
6 Demás 2000; Aslan et al. 2018, 14.
7 Vetnić 1974.
8 Perić et al. 2013; Perić et al. 2016; Perić 2017.
9 Perić 2009.

The site's unique position, in the remote vicinity of the Belgrade–Niš highway[10], generated an idea from which to form the *Centre for Neolithic Studies of the Balkans*. This centre will be established in Drenovac to provide a research basis for systematic explorations. Along with the scientific and research dimension, the centre will also have an educational, tourist, and ecological character. Also, with the existing support of the local community, the centre and site could significantly increase the touristic significance of these areas and at the same time contribute to the development of the local economy. Above all, there is a strong tendency to create a museological presentation of the site. The plan is that the centre will have a unique in-situ presentation of the Neolithic settlement with a temporary museum exhibition at the site itself. The role of the centre will also be to develop public archaeology activities to spread awareness and knowledge of the importance of cultural heritage, the life of people in the past, and the archaeological practice itself. The intention is to strengthen the scientific, educational and cultural aspects around the site itself. Mainly, this means that the Neolithic site of Slatina – Turska česma in Drenovac should be a place for research, on and off-site education for professionals and the wider public, and presentation. In a more practical sense, this involves a significant number of activities related to the site and the people and, in line with that, the many criteria that need to be harmonized. All these dictate the set of various requirements for the site's usage and its preservation plan.

Preventive conservation for archaeological in-situ remains: main principles and issues

Cultural heritage is not a monolithic concept; instead, it changes over time depending on a variety of factors – societal, scientific, political, and economic. All this affects how we see and use heritage in a professional sense and, beyond that, how we foresee its further transformation for museological and touristic purposes. Archaeological sites and movable finds represent a specific category. At the same time, cultural heritage can be a physical remnant, a scientific source, or a protected cultural heritage site. Changing models of site use such as opening sites to the public for research or touristic purposes, will influence the existing ambient equilibrium and alter environmental conditions[11]. These aspects usually coexist, with shifting priorities depending on the context and short and long-term decision making processes.

That said, creating meaningful and useful research, conservation, and a presentation plan represents a complicated task. This endeavour involves several disciplines – archaeology, conservation, and museology, all of which have their own specific sets of rules and agendas. However, their discursive frameworks have changed over time. Those variations can often directly influence decisions about how to present or preserve in-situ remains, what to use for intervention or which technology to apply[12].

The complexity of archaeological site transformation created a need for more integrated and holistic management, which can balance research, conservation, and the sustainable use of cultural resources. The holistic approach, an integrated conservation management program, encompasses the ethos of preventive conservation – observe, plan, react, monitor, and repeat everything. Preventive conservation can be understood as a field that encompasses all measures and actions that contribute to the avoidance or minimization of possible deterioration or loss. Those actions are focused on altering the context or the surroundings of a cultural heritage object or site. This means that the effects are indirect and, thus, do not directly affect the physical aspect of an object or a site[13]. On a more concrete level, the concept deals with the prevention of possible damage and mitigating any potential risk. Unlike remedial conservation, which involves direct and one-time interventions, preventive conservation, especially for sites, requires continual monitoring,

10 The Slatina site is intersected by the highway.

11 Henderson, Lingle 2019, 3.

12 Smith 2006; Bahamondez et al. 2012, 85.

13 Terminology to characterize the conservation of tangible cultural heritage, 2008.

Step	Activités	Purpose
1. Examination of the site	Documentary research; Revision of the research, social and cultural context of the site	Identification of essential documents and all parties involved – individuals and interest groups
2. Identification of causes of damage (diagnosis):	Gathering of information (previous studies); Identification of definite causes (circumstances and processes); Damage identification	Conservation condition survey
3. Classification of causes according to a risk level	Analysis of damage character (active or passive) and intensity; Elaboration of a risk hierarchy and risk prioritization	The risk assessment process and design of conservation plan management
4. Urgent measures	Implementation of a series of immediate measures	Remedial treatment for high specific risk and active deterioration process
5. Monitoring	Condition survey and data analysis; evaluation of implemented measures effectiveness	Implementation of regular inspection and data gathering
6. Regular maintenance	This step includes activities of various types: Tidying up and deweeding the territory surrounding the earthen heritage; Repairing and maintaining surface drainage	Implementation of routinely preservation procedures in the domain of preventive conservation to minimize risk effect
7. Re-evaluate and adapt	These steps imply reconsidering gathered data; réévaluation and adaptation following the context and analyzed data; should be done regularly once a year and in case needed more than that	Managing change and adaptation to the reevaluated context

Table 1 – Table illustrating preventive conservation steps for archaeological sites; adapted based on the steps proposed by Thierry Joffroy

evaluation and revision and planning, and re-implementation. In conclusion, preventive conservation influences the modalities of heritage usage. On a macro level, those measures include decision making based on data generated from several fields, to create long term and short-term activities, such as a prioritisation plan. The first steps of the process involve understanding the context, i.e., a research review of an archaeological project, relevant legislation, standards, and procedures and site usage models, all to develop risk management strategies that can be integrated into the site management plan[14].

On a micro level, it deals with the process of deterioration. Given the fact that the discovery of material findings brings artefacts into contact with oxygen and new, different, environmental conditions, for example, the presence of solar radiation or altered values of relative humidity and temperature, change is inevitable. In this way, the object's previous equilibrium with its immediate environment which, until that moment, had directly contributed to the preservation of the archaeological remains, is destabilised. Once exposed by excavation, archaeological materials are influenced by many agents of deterioration and are more prone to alterations[15]. How archaeological material will react to new ambient circumstances depends on the chemical and physical components and the micro and macro atmosphere in which it was[16]. Furthermore, the decision on current and future use will also dictate the preservation management. There is great importance placed on understanding the anticipated risks, which can be related not just to physical and chemical factors, but to anthropogenic agents as well[17].

14 Henderson, Lingle 2019, 1.
15 Pedeli et al. 2013.
16 Williams et al. 2016, 10–14; Henderson, Lingle 2019, 1.
17 Joffroy 2012, 256.

Thus, when it comes to archaeological site preservation plans, it is more a matter of dealing with acceptable changes or adaptations to context, than dealing with prevention of loss or damage. As a result of the latter, in the case of archaeological sites, alterations are unavoidable. That is the reason why preventive conservation must be a repetitive process, comprising of constant and periodical surveys that contribute to a long-term preservation plan[18] (see Table 1[19]).

Problems and challenges of earthen archaeological site preservation: preventive conservation aspect

In order to understand what happened in the past, archaeological excavations are the predominant method of research. Unavoidably, excavations directly influence the state of conservation and the processes of degradation, whereby finds or sites become more fragile and prone to decay[20]. This is especially true for those archaeological sites with earthen remains. The preservation of sites with earthen remains in-situ is a complex mission because the deterioration of earthen structures can happen unnoticeably, depending on numerous factors. Due to the unique material characteristics, the preservation of earthen sites gathers scientists from different disciplines, and still, it represents a challenge. This is why the problem of earthen site remains protection has been a significant concern globally. In addition, the preservation of early prehistoric sites[21] is still an insufficiently investigated area of conservation, both globally and locally in Serbia as well.

The first and foremost reasons for the destruction of archaeological sites and finds are related to mechanical damage, but usually together with environmental agents of degradation. Damaging factors may differ, from catastrophic events to cumulative agents of deterioration. These can be direct, short-term rainfall, which can cause erosion and collapse, or solar gain which influences dimensional changes. In addition, invisible cumulative processes such as inadequate relative humidity can play a part in degradation, causing salt movement or microbiological activity[22]. The effects of these deteriorating agents are amplified when it comes to earthen remains. As a result of material characteristics, the earthen remnants are more prone to changes that are influenced by the surrounding environment. Due to a variety of damaging exposure factors, when it comes to in situ structures the trend is usually to provide more durable protection on archaeological sites. On one level this means that it is of paramount importance to ensure that conservation measures are planned and performed alongside the excavations. These actions include the installation of temporary shelters, backfilling, and works that contribute to the stability of the remains. All these steps may be vital because there is a risk of rising damp at the base of structures after or during excavations which can be enormously dangerous for earthen materials, resulting in immense destruction of the discovered items[23].

Since Neolithic sites with visible structures are truly rare, the strong desire to permanently protect and present the findings is not a surprising response. However, sheltering is not a simple act. In most cases, the primary motive for building an archaeological shelter is to regulate the environment to provide favourable conditions for the conservation of the site. This is not a new preventive conservation measure. However, in most cases the planning of a shelter does not go through a thorough cost and benefit analysis, nor a review of the archaeological values. Depending on the management capacity and the archaeological context, a shelter can, therefore, constitute either a benefit or, potentially, a problem. Thus, as Curteis states, there is now a long history of sheltering that has been unsuccessful due to the failure to recognise some fundamental criteria[24].

18 Joffroy 2012, 256.
19 Joffroy 2012, 257–258.
20 Joffroy 2012, 259.
21 e.g. Paleolithic or Neolithic sites.
22 Curteis 2018, 40; Henderson, Lingle 2019, 2–3.
23 Joffroy 2012, 259.
24 Curteis 2018, 40.

Figure 1. The look at the shelter from the southern side

Prehistoric sites with earthen architecture are specific both in terms of their material authenticity and preservation rarity. Often, those sites are closely connected to the immediate surroundings. Thus, one has to take into consideration the significance of the place as a whole, thinking about the site limitations and boundaries in order to make decisions about what to protect and to consider the impact a shelter might have. In order to create a meaningful response to the needs of archaeological conservation management, recent studies suggest that sheltering should be understood as a ‘process, rather than a final act[25].

Preservation measures within the project

As stated, it takes the joint effort of several disciplines to navigate archaeological site research, preservation, and presentation in a balanced way. It is a challenge to develop a preventive conservation plan due to the sensitivity and specificity of the material, but also when it comes to maintenance procedures and the long-term protection of remains at the site during and after excavation. Taking into account the goals of the centre, the growth and the context of the Slatina site development and plans, it goes without saying that the introduction of preservation activities was a composite, but essential step. In line with the project development in 2013, the site received a shelter which protects the in-situ structures of the four Neolithic houses and various finds, covering 1200 m² in total (Fig. 1). The preliminary design of the shelter was made, along with a plan for the detailed regulation of the archaeological site in Drenovac. The initial design was to create a more suitable excavation setting for the archaeologist, but also to protect the remains from ambient agents of deterioration (Fig. 2). This twofold purpose could not meet the needs of both requirements equally and, in the following years, it was noticed that problems with condensation emerged.

25 Aslan et al. 2018, 11.

Figure 2. Interior of the shelter with the in-situ remains (2015)

In general, this was a period when the project team realised there should be a more holistic approach to the site's long term preservation. As a consequence, during 2016, The Center for Preventive Conservation[26], from the Center for Conservation – CIK, joined the archaeological project. Preventive conservation was introduced in order to perform an initial condition survey and an environmental assessment as a step to better understand the conditions under the existing shelter.

Although microclimatic factors can cause severe damage, this generally occurs over a more extended period. So, the moment when the change is noticed is when the damage has already been done[27]. Bearing in mind the longevity of the monitoring process, the environmental assessment can be done in numerous ways, and the list of the factors can differ depending on the general context. However, in most cases, carrying out essential microclimate monitoring, especially the collection of data on humidity and temperature, can be an indispensable initial step for understanding the situation. Basic monitoring provides essential data and insight into a site's environmental behaviour, which allows the creation of a cost-effective and protection efficient plan[28]. In the case of the Slatina site, the motive for the establishment of climate monitoring on-site was twofold. Models for archaeological site shelters are rarely tested, often leading to unstable and unpredictable conditions for remains[29]. This was the situation in this specific case study. In the process of building the shelter on an archaeological site, there is a range of criteria to take

26 The monitoring activities are realised under the CIK's program: Monitoring environmental conditions for archaeological sites, financed by the Ministry of Culture and Information in cooperation with the Institute of Archaeology

27 Curteis 2018, 42.

28 Curteis et al. 2007, 180–182; Curteis 2018

29 Neville 2012(2001), 458–459.

Figure 3.
Emergence of condensation on protective sheets

into consideration, such as aesthetics, cost, research, and planning issues. However, the chief principle should be the functionality and performance of the construction. When developing such a solution it is important to have sufficient information about deleterious factors and their impact probability, before deciding on any permanent actions[30]. One might posit as to why one would monitor in this phase, after the original shelter at this site had been erected. The usual premise is that effective in-situ protection is closely related to the understanding and knowledge of how different agents of deterioration correlate[31]. This includes the analysis of both natural and anthropogenic factors. The introduction of monitoring can give valuable information and data regarding the state of conservation of in-situ remains and what actions are needed[32]. Speaking of the monitoring degradation process, before deciding on sheltering, Curteis suggests that the following factors must be understood:

1) the nature of the damage;
2) the underlying causes of decay;
3) whether the deterioration is active or dormant;
4) control of the deterioration; and
5) other environmental risk factors[33].

Since there was no prior shelter design testing, the need for evaluation and monitoring was important. The introduction of preventive conservation procedures was necessary to understand the current shelter performance and to assess the conservation impact on the site and finds[34]. This was also a turning point for the project itself because there was evidence of condensation under the shelter on the protective sheets (Fig. 3). The condensation problem was a clear indication of a problematic microclimate that could be damaging to the *in situ* remains. In addition, analysis was vital since there was a plan to build a new shelter for future discoveries in the area[35]. Thus, this was the opportunity to learn. The second reason for the introduction of climate monitoring is related to the decision to perform remedial conservation[36]on the existing *in situ* Neolithic house remains.

30 Henderson, Lingle 2019, 2.
31 *cf.* Corfield 1996.
32 Henderson, Lingle 2019, 3.
33 Curteis 2018, 40.
34 *cf.* Curteis 2018.
35 Based on the performed geophysical research similar discoveries are to be expected.
36 Remedial conservation treatment was done in separate conservation project in 2017, by external conservation professionals.

Besides measuring ambient temperature and relative humidity, surface temperature measurements of the remains with Infrared temperature thermometer for non-contact measuring (IC gun) were made as well. Recently, thermal imaging of the house remains was introduced to the site monitoring procedures. Consequently, this was done to provide data for an overall condition assessment and a risk assessment. The latter is still an ongoing process.

Monitoring environmental conditions at the Neolithic site of Turska česma – Drenovac
Climate conditions were monitored for 360 days, for the period from November 12, 2015, to November 5, 2016. Afterwards, monitoring was continued for 267 days, for the period from July 23, 2017, to April 15, 2018. This gave a total monitoring duration of 627 days, or one year and eight months. The monitoring period covered all four seasons in both campaigns. TESTO 174H data-loggers were used for data gathering, set to record values on every hour. In the first campaign, four instruments were set up: one that followed the external conditions (MP1), one at the level of the contemporary soil level (MP2), one at the level of the in-situ remains (approx. 2 m depth) (MP3), on a small picket, and one within the Neolithic house (MP4) (Fig. 4; Table 2). The latter data-logger was covered with geotextile and plastic materials, from approximately November to April. At the beginning of the measurement period, the logger from the contemporary level was stolen. Hence the measurements during the first session were covered by the three remaining instruments. In the second campaign (2017–2018), the four devices were again placed at the same measuring points and recorded temperature and relative humidity for the whole time.

The analysis has shown that annual temperature fluctuations range from 23° C to 26° C and are in line with seasonal climate changes that are characteristic for that specific geographical location (Fig. 5). When looking at the relationship between the maximum and minimum values of temperature on the daily level, they show the same trend. It is conclusive that the external temperature values influence the temperature at the level of MP3 and MP4. In addition to this, the average daily temperature fluctuation outside is 11.3° C and in the protective structure it is 10.2° C. On the level of house remains, the daily fluctuation are similar, 11° C MP3 and 8.4° C MP4. This indicates a minimal difference between the external and internal values. One of the acute problems at the site is the occurrence of condensation on the protective materials that are covering the

Figure 4. Data-loggers placement on measuring points

measuring points	location
MPI	outside the shelter
MP2	contemporary soil level
MP3	wooden pole – excavation level (approx. 2 m depth)
MP4	Neolithic house remains-probe 21/1

Table 2 – The measuring points location distribution

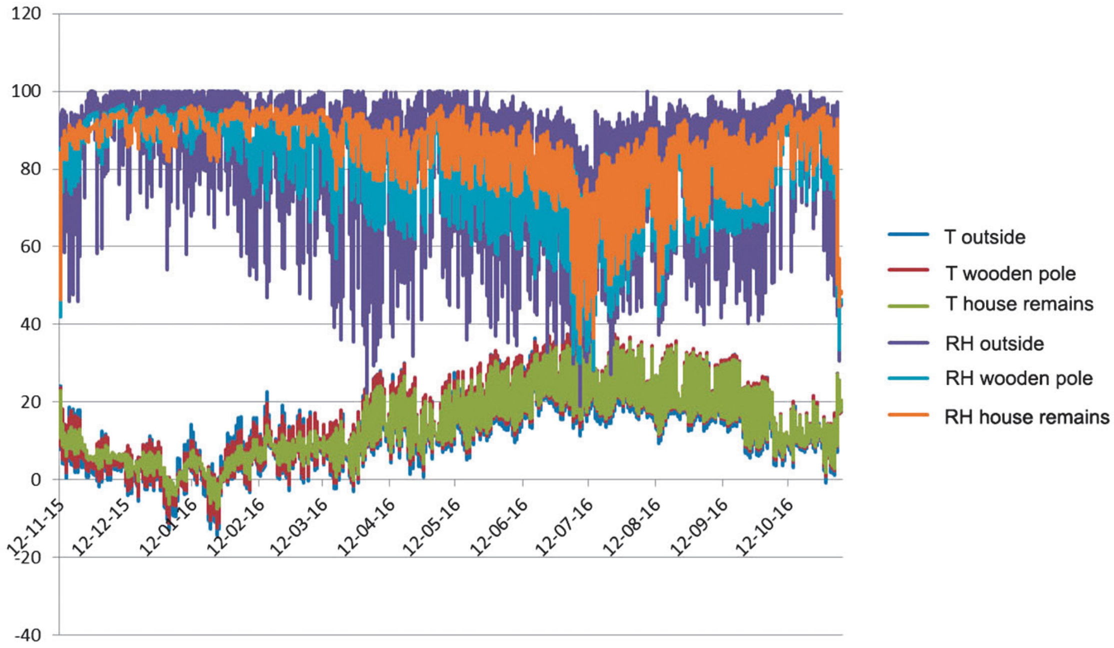

Figure 5. Temperature and RH values during 2015 and 2016 campaign

archaeological remains in-situ. This phenomenon is possible since there were very high values of relative humidity throughout the entire observed period. Specifically, the average daily values for the entire period range from 80% (MP1–82.5%, MP3–81.9%, and MP4–85.8%), while average daily oscillations of the relative humidity values for the whole period are 35.9% in external conditions and 17.1%, or 11% for the internal measuring points. The most unstable period began in April 2016 and lasted until the end of the observed period, that is, in October 2016. Generally, in such an environment, the dew point is easily reached, thus condensation is expected. That happened on the Slatina site during 2015 and 2016. Condensation can be problematic not only because of its appearance on the original material but also on the walls of the protective materials, which can additionally contribute to the increase of the relative humidity in that area. The highest recorded daily oscillations were 70.8% for the external conditions, and 48.7%, or 42.6% for internal ones. It appears that the shelter is buffering the relative humidity variations, although the internal daily changes still exceed the recommended 10% within which there is little chance of damage to the original material. The increased risk at sites of this type (with earthen structures) is intensified due to humidification and drying cycles[37]. This risk can lead to so-called fatigue and damage in the form of cracking, deformation, and in some extreme cases even collapse of the original material[38]. This phenomenon contributes to the weakening of mechanical bonds of the surface layer and the body of the structure. An additional factor is the fact that the site is located on a type of soil characterised by a high content of salt. Due to the existence of soluble salts, which can react with the unstable environment[39], minuscule deterioration and mechanical stress were noticeable in some house parts. Oscillations of the surface temperature accelerate the mechanisms mentioned above, which result in salt efflorescence on the surface of *in situ* findings, representing a secondary risk for the original material at the site, mechanical-structurally, but also

37 Williams et al. 2016, 20–21.
38 Camuffo 2014, 13–14.
39 Henderson, Lingle 2019, 3.

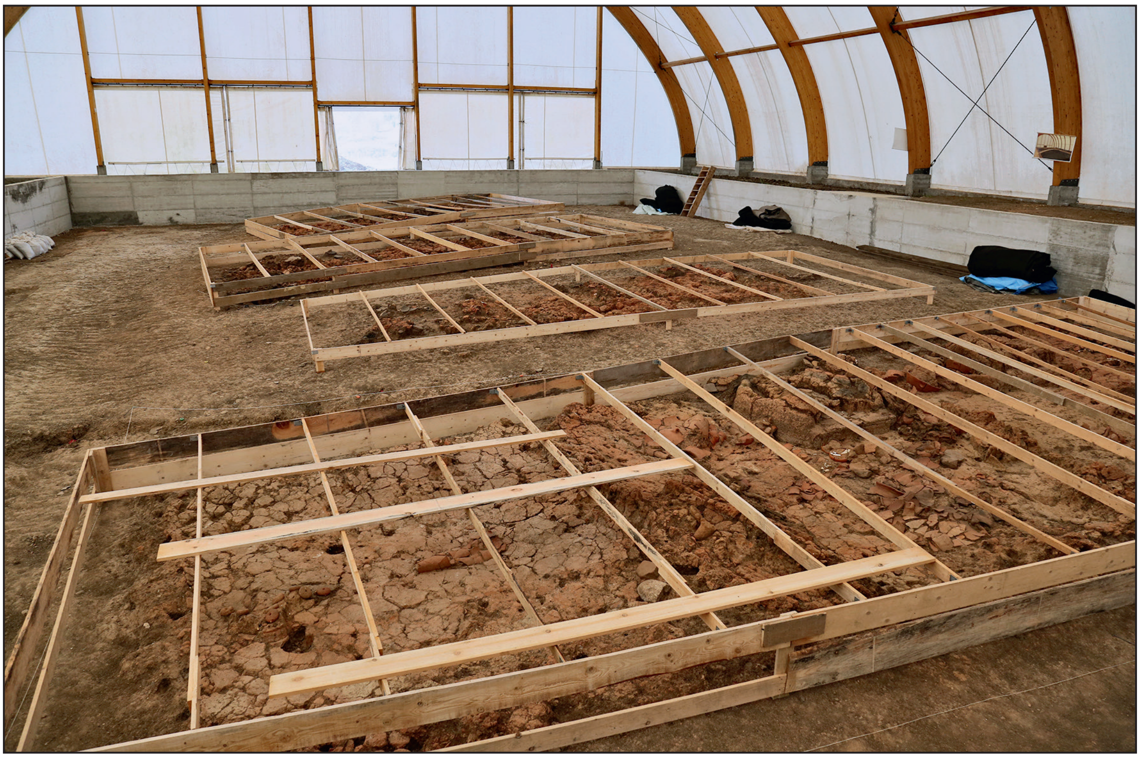

Figure 6. Added wooden construction for protection of the house remains

chemically. This may not be too dangerous a process for some movable finds and materials which can be treated separately, but when it comes to *in-situ* remains the deleterious effects can only be moderated with environmental control[40]. The other risk especially increases when the site is covered with protective materials because condensation from the inside appears. The in-situ remains are subject to the risk of mould formation due to increased moisture in the material or its immediate environment as well. The problem of elevated relative humidity in combination with mild temperatures and nutritious substrates is the ideal atmosphere for the development of moulds, bacteria, or some other parasites. For example, algae and cyanobacteria require high RH (RH> 65%) for the development of the mould. However, if there is original material deterioration and infestation, with the presence of moisture, which can be the case at the Slatina site, the risk of microorganisms is already at 50%[41]. Also, being able to impair the look of the findings aesthetically and the remains at the site, microorganisms simultaneously affect the physical structure of the material (at a micro-level) as well.

These were the issues recorded during 2015 and 2016. In the following year, the new preventive measures were introduced. During the second campaign, the wooden construction was added for the protection of the in-situ remains during late autumn, the throughout winter and spring[42] (Fig. 6). The placement of another protective construction was organised to test whether an additional insulation layer would create a more suitable microclimate for the houses. With this modular wooden framework, the structures were covered again during the damp and cold months, but using a different method, which allowed more air circulation, since no material was placed

40 Correia et al. 2015; Henderson, Lingle 2019, 3.
41 Camuffo 2014, 95–97.
42 November 2017 – April 2018.

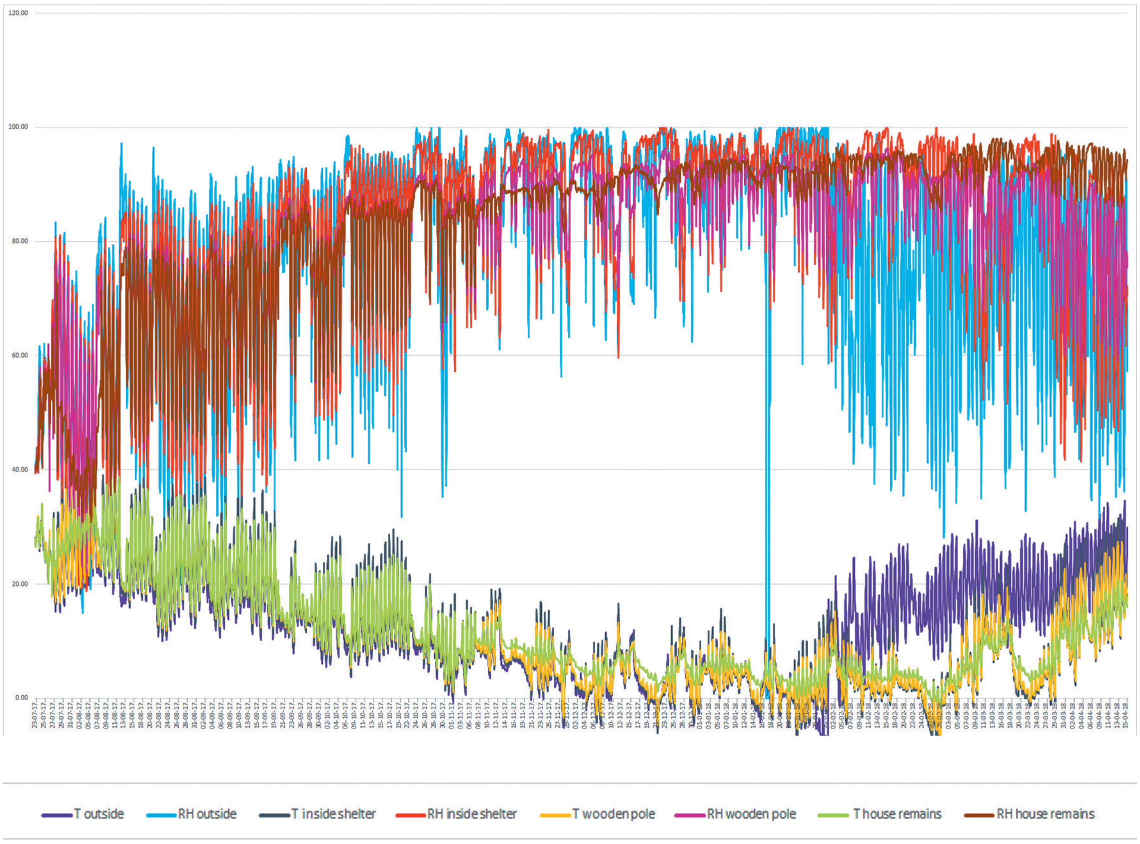

Figure 7. Temperature and RH values during 2017 and 2018 campaign

directly on the earthen remnants. Comparing the second campaign results with the first, analysis showed similar effects (Fig. 7). As in previous measurements, the protective structure, as well as the added protection systems, did not create an additional protective barrier when it comes to temperature. In general, minimal differences between the outside and in the inside values were recorded. However, when it comes to temperature values, there was a small difference in the winter period. That is, when the outside temperatures rose, inside temperature values remained unaffected by these external changes.

It appears that the most significant benefit in setting up wooden protective structures lies in the fact that they stabilise the temperature in the winter period. The temperature at the MP3 and MP4 levels, the level of the finds, did not drop much below zero. The temperature did not drop below -1.9° C, which was not the case with the values in the first campaign. Generally speaking,

	MPI – external	MP2 – contemporary soil level	MP3 – wooden pole	MP4 – Neolithic house
avg	35.6	24.7	16.6	10.8
max	65.8	51.1	41.3	37.3
min	3.2	1.1	1.3	0.5

Table 3 – Display of average, maximum and minimum relative humidity daily oscillations according to measuring points

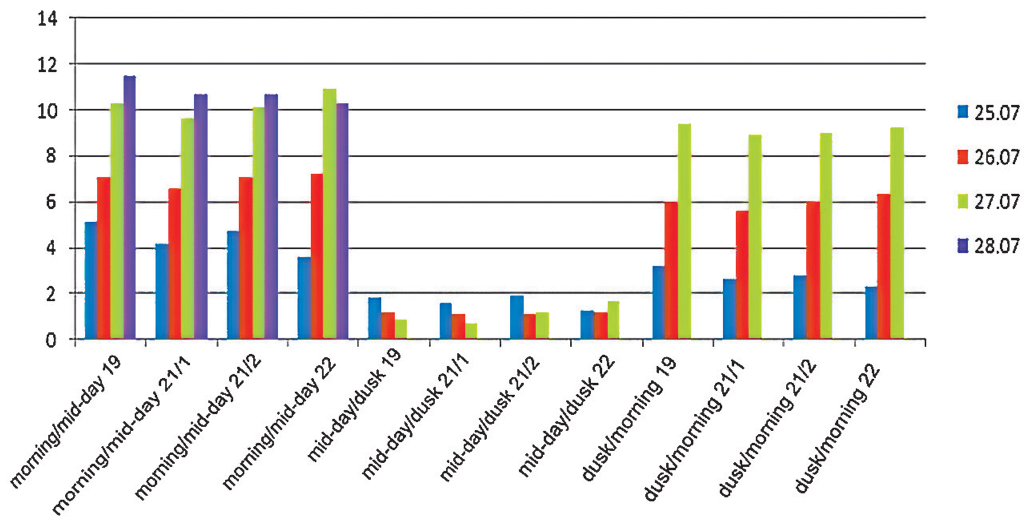

Figure 8. Average difference in daily measurements for the period 25–28 July 2017

the relative humidity data from the 2017–2018 monitoring campaign did not differ much on an annual basis from the previous one. The highest daily oscillations were 65.8% for external conditions, and 51.1%, i.e., 41.3% and 37.3% for internal ones (e.g Table 3). Also, it is noticeable that from November, when additional protective constructions were installed, the values of oscillations decreased, but not the values of relative humidity in total.

As previously stated, the most frequent cause of damage to archaeological material at the site is due to daily fluctuations in climatic conditions. Those oscillations can manifest as a change in temperature or on the in-situ structures themselves. Thus, besides environmental temperature and relative humidity, the surface temperature of the house remains was briefly monitored as another possible agent of deterioration. This was done with a non-contact infrared thermometer for non-contact, an IC gun. The surface temperature was monitored because oscillations can cause dimensional alterations of materials. When it comes to earthen archaeological, it is particularly problematic due to their complex content and execution techniques, which may include materials with different thermal responses. The difference in thermal response often causes stress, with physical failure as a result. The present research shows that this can occur during the daily heating and cooling process or due to the photosensitivity of some materials (e.g. exposure to high IR or UV levels)[43]. The monitoring period was during July 2017, when the surface temperature of the house remains were measured for four days. Measurements were carried out at dawn, around 5 am, mid-day (around noon) and at dusk, around 7 pm. Analysis of the surface temperature of the houses showed that the most considerable differences in surface temperature occurred between the morning measurements and the hottest part of the day, around 1 pm, and then differences appeared during the cooling period, overnight (Fig. 8). The average temperature difference was the highest in the last two days between the morning and afternoon measurements, which is also true for the average temperature difference between the evening and the morning hours.

The most significant problem of changes in the temperature of the remains relates to the risk of mechanical stress based on constant changes in the surface temperature of the find. Since all conducted data gathering and research has shown a worrying climatic impact of existing conditions, thermal imaging was performed. Thermal imaging was carried out with measurements over a 24-hour cycle on 23rd and 24th July 2019. The measurement was taken early in the morning, at

43 Curteis 2018, 42; Correia et al. 2015, 225–228.

7 am, then 1 pm and finally at dusk, around 7:30 pm. Before the measurement, the emissivity was set at 0.92. Imaging was carried out using a Flir camera and a Flir PRO1 camera for mobile phones. This was a test survey, but the general goal is to perform seasonal monitoring. By July 2020, it is planned to have had at least five more tests. Preliminary results show that there is consistency with previous monitoring[44], but there is no enough evidence to make conclusive statements at his point.

Advantages and disadvantages of the preservation of prehistoric archaeological sites – lessons learned

The tendency to create a closed or semi-enclosed system for the protection of archaeological sites is not a novelty. However, the cost-benefit analysis does not always justify the intervention, nor is the sheltering always consistent with the conservation of the in-situ remains.

The construction of shelters in an archaeological site is a very complex process. It requires research of the condition of the remains and risks to which the site and the original material are exposed. Furthermore, the impact on the existing archaeological context and landscape of future excavation also has to take into consideration. This means that the shelter has to be visually sensitive so it can enhance the values of the site and landscape, both scientifically and museologically. Without this consideration, the shelter can become a source of additional threats and unwanted deleterious environmental conditions that may lead to the need for new conservation treatments or an estimation of interventions needed[45]. Thus, when it comes to the preservation of archaeological sites and landscape management, one must not forget the diversity of issues and concerns which need to be addressed in terms of research, conservation, interpretation, sustainability and local community participation[46].

Even though the shelter for the Slatina site was erected to provide a better work environment, as well as to protect the existing structures, unfortunately, the developed model did not fulfill its purpose completely. Based on the data analysed and preliminary results it can be concluded that the installed shelter only protects from atmospheric events while, in terms of the temperature and relative humidity, it is not possible to confirm the efficiency of the existing protection. This was an initial monitoring phase, and the data gathering offered the chance to evaluate the existing state and learn from the decisions made to adjust the approach for future actions. Also, the same goes for its integration into the landscape setting, given its closed construction and strong visual impact on the surroundings. A preventive conservation strategy aims to ensure that an archaeological site, such as Slatina, has the best possible conditions for research and use.

As many authors have pointed out, sheltering an archaeological site is not just about its protection. In the same way that conservation management is not just about preservation and making presentation possible. Focusing solely on safeguarding remains is neglecting the whole scope of archaeological site management[47]. Risk identification is just a tool, not a purpose. Ultimately, a value-based approach to managing change can be key to understanding and utilising the “golden ratio” of research, conservation, and usage of archaeological heritage sites. As shown in many case studies, acknowledging and analysing heritage values to understand the benefits of sheltering helps us capture important additional inputs in all stages of the process[48]. Introducing value-led decisions can inform us better about the decision to shelter, then the design process, implementation, and management. It is about recognising that shelters create opportunities as much as they respond to threats. Such an approach also obliges every choice to be grounded in broad consul-

44 e.g. These measurements confirmed what has already been established with the IC gun
45 Curteis 2018, 49; Aslan et al. 2018,14; Henderson, Lingle 2019, 3.
46 van der Linde, Williams 2006, 119–120.
47 sf. Matero 2001; Stanley-Price, Jokilehto 2002; Palumbo 2002; Neville, 2012 (2001).
48 Aslan et al. 2018, 22.

tation and consensus built around real benefits for the site and its communities, protecting us from random aesthetic choices or sheltering for the wrong reasons[49].

Instead of conclusion – What next?

Preventive conservation represents the basic framework for preservation planning. In the case of archaeological site management, preventive conservation should become part of the standard development process and should be considered from the beginning of the project[50]. Additionally, fragile sites, such as those with earthen structures, could benefit greatly from the introduction of an integrative conservation model. Preventive conservation enables a solid understanding of the circumstances and processes of degradation in line with the use and purpose of the heritage asset. The goal is to choose the optimal solution among the range of other possible measures and to envisage the consequences of their implementation. It is not just a matter of pure technicality. Instead, it is an idea of a functional system in which every mechanism contributes to the whole. This approach strives for integration, taking into account the evolution of the cultural, social, and economic environment[51]. This leads to the conclusion that preventive conservation is, by its very nature, a concept well adapted to archaeological site management, which integrates knowledge from several disciplines.

This two-year experience in monitoring and understanding site research and representation characteristics has brought much new knowledge into the project. Currently, risk assessment and the establishment of values is the biggest priority for the upcoming actions. This means that the current and future steps are all directed toward condition assessment, taking into account: all planned activities on the site, a value assessment, risks that can affect the preservation of the site, and the continuation of environmental monitoring. The ultimate goal is to develop a management plan that includes preventive conservation measures alongside an integrated site management program. All these have to be harmonised with the specificities of the physical, economic, and social context of the site.

The the methodology we use to discover, protect, and present archaeological heritage is an ongoing process, and this decision made cannot be based on a single, one-time criteria. Instead, managing an archaeological site and balancing its scientific, cultural, and societal significance has to be value-led and is, thus, susceptible to change. Even though the management of a site has a multitude of practical aspects in its essence, it is determined by the ascribed values and the interpretational framework. Just as one sudden discovery during excavation can change the whole direction of the research, changes in the value and significance of a site can redirect the entire conservation and presentation agenda as well. An archaeological preservation programme is more about creating and navigating change, than preventing its existence.

49 Aslan et al. 2018, 22.
50 Demás 2000; Aslan et al. 2018, 14; Henderson, Lingle 2019.
51 Joffroy 2012, 256.

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Резиме

Проблеми и изазови менаџмента праисторијских локалитета.
Пример неолитског налазишта Слатина–Турска чесма
у Дреновцу код Параћина

Археолошка баштина је сложен концепт који превазилази пуку материјалност. Садржи покретне и непокретне остатке, доказни и интерпретативни појам материјалних трагова из прошлости. У исто време, археолошка баштина је крхки и необновљив научни, културни и друштвени ресурс. Њена употреба се, дакле, мора систематски планирати и како би се умањила могућност уништавања разнородних вредности које физички остаци могу да садрже и/или пренесу. Овај рад описује успостављање програма управљања заштитом неолитског налазишта Слатина–Турска чесма у Дреновцу код Параћина, интеграцијом превентивне конзервације са археолошким истраживањима. Такође, текст представља покушај рефлексивног, критичког прегледа реализованих активности и ефеката постојећег заштитног заклона на локалитету. Циљ је проценити тренутне прелиминарне резултате и размотрити могуће, будуће кораке.

CIP – Каталогизација у публикацији
Народна библиотека Србије, Београд

903"634"(497.11)(082)
903"634"(4-12)(082)

The NEOLITHIC in the Middle Morava Valley : interdisciplinary contributions to research and preservation of archaeological heritage / Editors-in-chief Slaviša Perić, Miomir Korać, Branislav Stojanović ; [translation Marin Markoš]. – Belgrade : Institute of Archaelogy ; Paraćin : Regional Museum, 2019 (Belgrade : Birograf Comp). – 94 str. : ilustr. ; 30 cm. – (The Neolithic in the Middle Morava Valley, ISSN 1820-4724 ; no. 3)

"The monograph is a result of scientific project OI 177020 – Archeology of Serbia: cultural identity, integratian factors, tehnological processes and the role of the Central Balkans in the development of European prehistory." –> kolofon. – Tiraž 500. – Napomene i bibliografske reference uz radove. – Bibliografija uz svaki rad. – Резимеи.

ISBN 978-86-6439-053-8 (IA)

1. Perić, Slaviša, 1956– [уредник]
а) Археолошки налази – Поморавље – Неолит – Зборници б) Керамика – Србија – Неолит – Зборници
в) Неолит – Југоисточна Европа – Зборници

COBISS.SR-ID 282248716

9 788664 390538