

IL DISEGNO FURIOSO FURIOUS DRAWING

47° CONVEGNO INTERNAZIONALE
DEI DOCENTI DELLE DISCIPLINE DELLA RAPPRESENTAZIONE
CONGRESSO DELLA UNIONE ITALIANA PER IL DISEGNO
ATTI 2026

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OF REPRESENTATION DISCIPLINES TEACHERS
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a cura di

curated by

Marcello Balzani, Manuela Incerti, Federica Maietti, Luca Rossato, Fabiana Raco

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Marcello Balzani, Manuela Incerti, Federica Maietti, Luca Rossato, Fabiana Raco

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PART III

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Focus 2 | The recovery of memory (the journey to the Moon)

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Ruins in dialogue: Reimagining Duklja through digital methods

Tamara Mracevic
Carlo Inglese

Abstract

This article presents a comprehensive architectural, archaeological, and methodological reassessment of Doclea (Duklja); the most significant Roman urban center in modern Montenegro. The study utilized a sophisticated synthesis of archival research, advanced geophysical analysis (GPR), GIS modeling, and digital reconstruction to achieve a multi-layered understanding of the site. A primary emphasis was placed on the innovative application of digital skills, notably the creation of the first accurate volumetric 3D model of Duklja. This model, built using Google Earth data and Blender, enabled precise volumetric analysis and led to a refined interpretation of the urban grid. The culmination of this digital scholarship is the proposed new Digital Museum model - an interactive website that dramatically enhances the site's educational, cultural, and conservation potential. By providing universal access and layered engagement with the architectural findings, the project ensures Duklja's legacy is preserved, studied, and publicly valued.

Key words

Digital models, Digital museum, Doclea, GIS, GPR.



View of the forum in
roman site Duklja ,
Elaboration by Catherine
Owen.

*"Quivi è raccolto ciò che in terra si perde,
per nostro difetto, o per colpa del tempo."*

Ludovico Ariosto, Orlando Furioso, XXXIV, 73

Introduction

Duklja, the largest late-antique urban complex in Montenegro, lies north of Podgorica at the confluence of the Zeta and Morača rivers. Set on a triangular plateau, its geometry-driven layout reflects strategic, symbolic, and infrastructural intent. Preserved remains of administrative buildings, housing, religious structures, and fortifications reveal a Romanized urban landscape carefully integrated with topography and indigenous contexts. Despite over a century of archaeological investigation [Kalezić, Škatarić, Spalević 2024; Cozzolino 2019], Duklja remains marginal within both scholarly discourse and public awareness. This paper positions itself not merely as a documentation effort, but as an investigation into how digital methodologies can reframe the epistemological and perceptual status of underrepresented archaeological sites.

The research is guided by the following questions: (i) how can incomplete, heterogeneous, and partially inaccessible datasets be synthesized into a coherent spatial model; (ii) to what extent can such a model contribute to the reinterpretation of Duklja's urban morphology; and (iii) how can digital platforms act as mediators between scientific knowledge and public engagement in cases of neglected heritage?

In recent years, digital heritage has increasingly emphasized the integration of documentation, modelling, and dissemination within coherent research frameworks [Addison, Gaiani 2000, pp. 26–31; Remondino, Campana 2014, pp. 1–9]. This contribution engages with the conference theme by examining how survey, documentation, and digital modelling can support the reconstruction and interpretation of fragmented archaeological context.

Historical context of Duklja

During the Flavian period, Duklja regained the status of municipium, initiating a phase of urban consolidation and architectural development. Shortly thereafter, the city was enclosed by fortification walls and marked by a ceremonial triumphal arch, which defined its political and civic center. The construction of thermae and the forum contributed to the image of a well organized Roman city structured by a clear urban grid. Around 490, Ostrogothic incursions severely damaged the architectural fabric, and in 518 a major earthquake destroyed or destabilized many remaining structures. During the medieval period, Slavic communities reoccupied the site, adapting the Roman urban framework and reusing architectural remains, particularly visible in the late antique churches of the eastern sector.

The first systematic archaeological investigations at Duklja began in 1890, when King Nikola I Petrović commissioned the Russian scholar P. A. Rovinski to lead a research campaign [Marković 2006]. In 1893, the British expedition led by J. A. R. Munro identified late antique and early medieval Christian churches, significantly advancing knowledge of the site. Piero Sticotti's 1913 publication provided a comprehensive architectural and morphological analysis that remains a key reference for understanding Duklja's spatial organization [Sticotti 1913].

Survey methods

The archaeological landscape of Duklja has remained remarkably intact due to a historical lack of modern development, with only a mid twentieth century railway line significantly altering the site since the first systematic urban maps were published by Piero Sticotti in 1913 . During this period, the New Ancient Duklja Project, involving the Universities of Urbino and Southampton, began utilizing laser scanning and ground penetrating radar to reconstruct the city's Roman morphology. In tandem, Ca' Foscari University's Late Antiquity Focus project applied photogrammetry to ecclesiastical masonry to refine the spatial timeline from the Imperial era. These efforts were modernized further through recent surveys that employed Topcon GR5 differential GPS systems to achieve centimeter-level georeferencing of remains. All of this data was synthesized within a Geographic Information System that integrated terrain models and remote sensing imagery to analyze the city's relationship with its topography. The GIS approach allowed researchers to see how modern stone boundaries still follow the ancient limestone foundations of an Augustan grid and how soil anomalies from remote sensing suggest the existence of a hidden eastern moat.

Since 2016, the use of ground penetrating radar has become the most essential method for the non-invasive exploration and management of the site. As shown in the aerial view photographs (figs. 1-2), by deploying an advanced IDS RIS-K2 system, researchers conducted 3D subsurface screenings to detect buried structures without excavation. The resulting time slices offer a stratigraphic view of the monumental core, revealing the precise locations of buried masonry and providing the first empirical evidence for a porticoed cardo and subterranean water pipelines.

Beyond confirming the existence of previously hypothesized rooms and courtyards, the GPR results provided empirical evidence for a porticoed cardo and even potential subterranean water pipelines. With only ~20% of Duklja excavated and substantial architectural loss from stone robbing, researchers integrated archival evidence with archaeology of architecture to reconstruct its monumental core. The analysis identifies a non-canonical

Forum plan likely reflecting military or imperial typologies, evidence of elite refurbishment

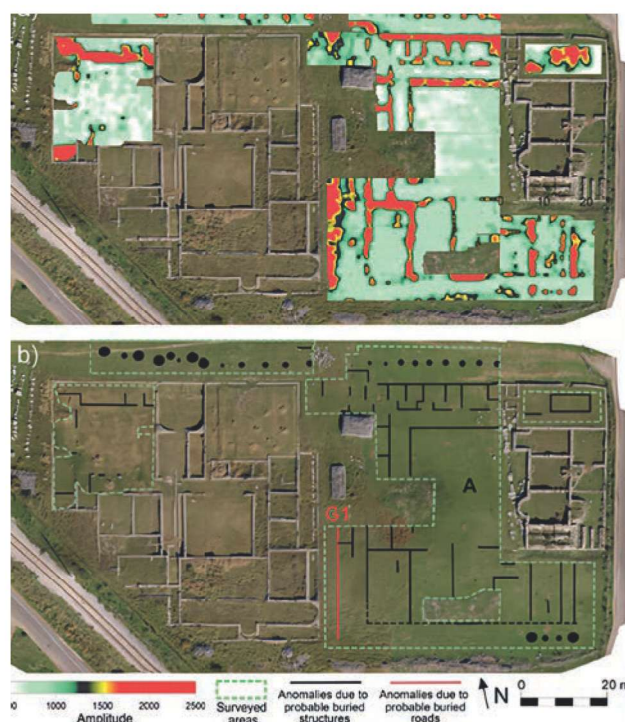


Fig. 1. GPR results between the thermae: time slice relative to the time window 14-18 ns (about 0.7-1.4 m in depth), overlapped on the photogrammetric image (a) and identification of anomalies (b)[Cozzolino, Gentile 2019].

Fig. 2. GPR results in the southern part of the private houses: time slice relative to the time window 14-18 ns (about 0,7-1,4 m in depth), overlapped on the photogrammetric image (a) and identification of anomalies (b) [Cuzzolino, Gentile 2019].



in the Basilica, and a four-phase development sequence for the Large Thermae explaining its departure from standard Roman symmetry.

Digital model

The 3D terrain model of the ancient Roman and Byzantine city of Duklja near Podgorica, Montenegro, was created to provide a geometrically accurate base for architectural reconstruction and integration of survey data. It is important to clarify that the methodological choices adopted in this research were significantly shaped by constraints related to site accessibility. While high-resolution acquisition techniques such as laser scanning and photogrammetry remain the standard in archaeological documentation [Remondino, Campana 2014], their application is not always feasible in constrained environments. During the development of this study, direct access to the archaeological area became increasingly restricted due to environmental conditions, dense vegetation, and safety concerns, ultimately preventing the implementation of high-resolution survey techniques such as terrestrial laser scanning or close-range photogrammetry.

The use of Google Earth elevation data, although inherently less precise than ground-based measurements, provided a consistent dataset evaluated through sectional analysis and archival comparison. In contrast to fully developed digital twin frameworks, which rely on continuous and high-resolution data integration [Boje *et al.* 2020], the model presented here should be understood as an interpretative reconstruction based on heterogeneous sources.

The choice of Blender and ArchiCAD software for the creation of 3D models was not merely for visual fidelity, but to establish a 'spatial engine' capable of supporting a future interactive environment. By treating the reconstruction as a provisional digital twin rather than a static render, we ensured that the resulting volumetric data remained flexible enough for web-integration.

While the term "digital twin" is employed in this study, it is used in a conceptual rather than strictly technical sense. Unlike fully data-saturated digital twins derived from high-resolution scanning, the present model operates as a provisional and interpretative counterpart of the physical site. Its value lies not in exact replication, but in its capacity to aggregate, structure, and communicate complex archaeological information within a coherent spatial environment. Publicly available geospatial data were imported into Blender version 3.x

using the RenderDoc add-on as a bridge between data sources and modeling. The process began by defining a rectangular area of interest in Google Earth that included the ruins and surrounding landscape, ensuring contextual coverage for topographical analysis (fig. 3) in addition to the graphic representation of elevation heights (fig. 4). The RenderDoc recording function captured SRTM server data, downloading the required digital elevation model tiles. These were mapped as displacement textures onto a planar mesh, generating a high-fidelity three-dimensional terrain.

ding landscape, ensuring contextual coverage for topographical analysis (fig. 3) in addition to the graphic representation of elevation heights (fig. 4). The RenderDoc recording function captured SRTM server data, downloading the required digital elevation model tiles. These were mapped as displacement textures onto a planar mesh, generating a high-fidelity three-dimensional terrain.

The mesh was georeferenced and validated by checking absolute elevations against identifiable site features, including the center of the Roman Forum. High-resolution geo-corrected satellite orthophotos were applied using UV mapping to produce a photo-realistic surface (figs. 5-6). Vertical parameters were quantified through altimetric cross-sections along the river-to-site axis, providing precise structural heights relative to the natural terrain.

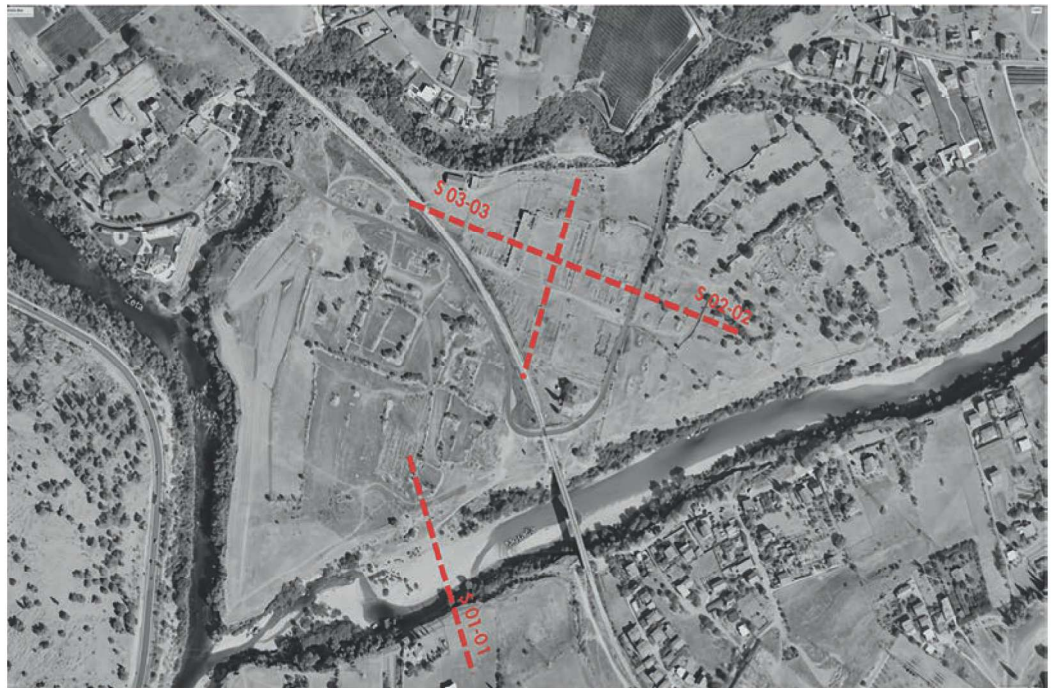


Fig. 3. The aerial view of the sections taken from the site in Google Earth, with focus on sections of the review and two sections (S02-02, S03-03) directly on the Duklja site. Elaboration by the author.

The finalized mesh was exported from Blender to ArchiCAD in .obj or .fbx format to preserve georeferencing, where 2D foundation lines, as represented technical drawing (fig. 7) were converted into volumetric elements such as walls, columns, and slabs, based on archaeological measurements of 0.6-meter wall thicknesses and 3.5-meter floor heights (figs. 8-9).

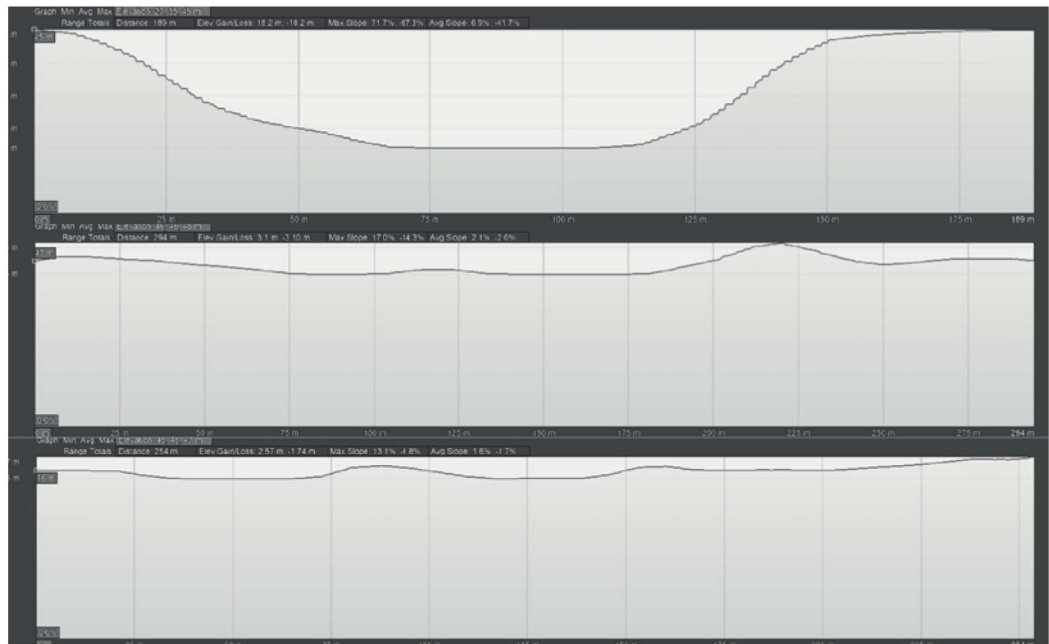


Fig. 4. Elevation view of the sections in Google Earth. Elaboration by the author.

The mesh was georeferenced and validated by checking absolute elevations against identifiable site features, including the center of the Roman Forum. High-resolution geo-corrected satellite orthophotos were applied using UV mapping to produce a photo-realistic surface. (figs. 5-6) Vertical parameters were quantified through altimetric cross-sections along the river-to-site axis, providing precise structural heights relative to the natural terrain. The reliability of the reconstructed model was assessed through a process of internal consistency checking, including the comparison of elevation data across multiple sectional profiles and the alignment of reconstructed elements with known archaeological measurements derived from published surveys.

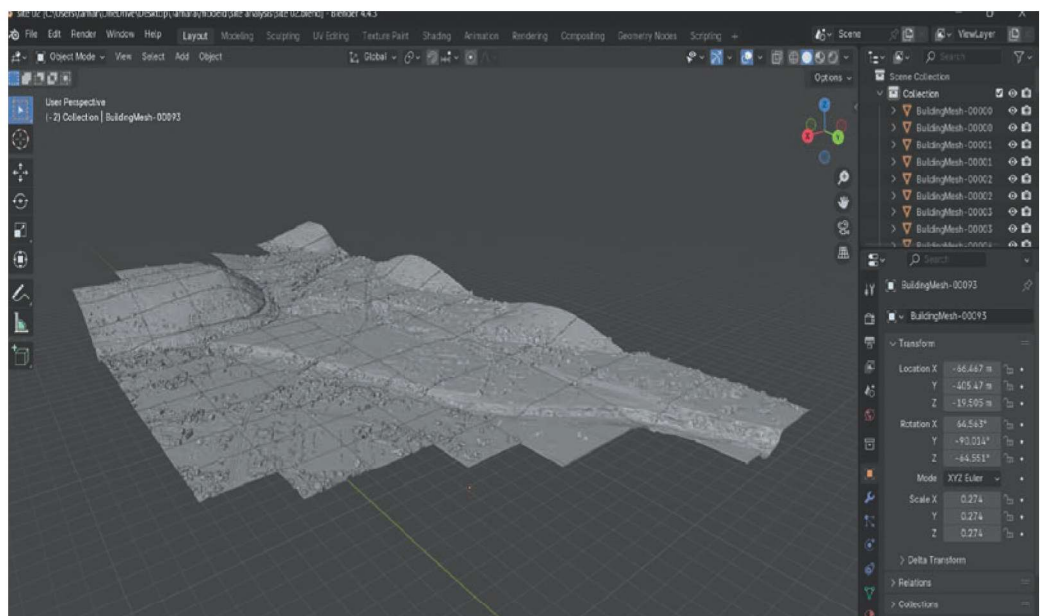
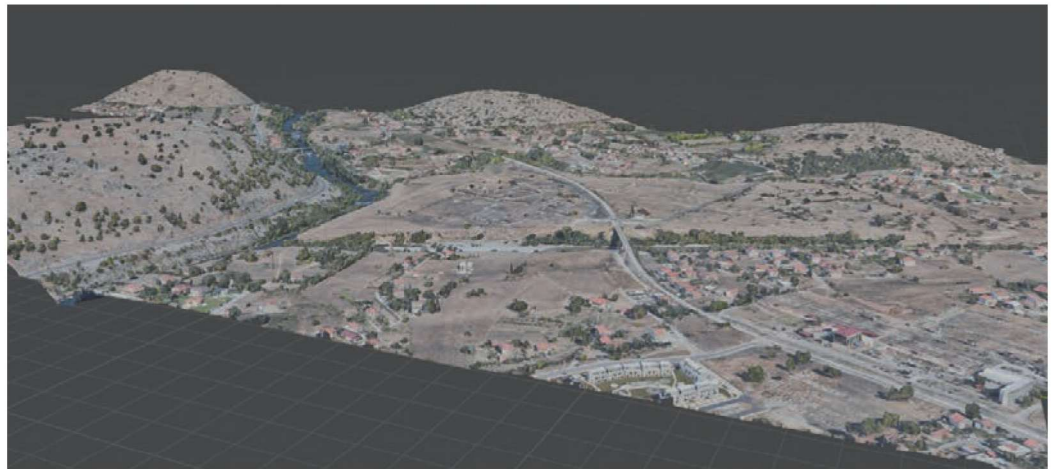


Fig. 5. Model of Duklja in Blender; before UV mapping. Elaboration by the author.

Fig. 6. Model of Duklja in Blender after UV mapping. Elaboration by the author.



Nevertheless, the absence of direct metric acquisition introduces a degree of interpretative uncertainty, particularly in relation to vertical dimensions and the precise articulation of architectural details.

Ultimately, the metric precision of these volumetric assets: from the 0.6m wall thicknesses to the georeferenced site boundaries serves as the scholarly foundation for the Digital Museum. This technical rigor ensures that the public-facing interface is not just an illustration, but a direct extension of the archaeological data. This workflow ensured a parametric reconstruction grounded in survey data. The resulting model allowed the creation of an accurate urban grid and floor plan of Duklja, enabling volumetric calculations, hydrological modeling, and assessment of original construction mass.

As the first publicly available model of the site, it provides a detailed and accessible tool for research, conservation, education, and the valorization of Duklja's historical and architectural heritage.



Fig. 7. Floor plan of Duklja realized in Archicad. Elaboration by the author.

Fig. 8. Aerial view of the 3D model of Duklja realised in Archicad. Elaboration by the author.



Fig. 9. View of the 3D model of Duklja realised in Archicad. Elaboration by the author.



Digital museum

The culmination of this multi-scalar research is the Digital Museum of Duklja, an interactive repository for the project's archaeological datasets. The Digital Museum is conceived not merely as a dissemination tool, but as an interface for knowledge structuring. By organizing spatial, historical, and typological data within an interactive environment, the platform enables users to navigate the site through multiple interpretative layers, effectively transforming passive visualization into an exploratory process. This approach reflects broader developments in virtual heritage environments, where accessibility and user interaction are central to the dissemination of archaeological knowledge [Sylaiou *et al.* 2010].

The goal of the 'Ruins in Dialogue' website is to translate the complex spatial data generated in the previous phase into a series of layered engagements suitable for both researchers and the general public. Particular attention has been given to accessibility and reproducibility. The Digital Museum is conceived as an open-access platform, allowing both on-site visitors and remote users to engage with its content without restrictions. The development process utilized Figma software to prototype a user-centric interface, ensuring a seamless experience for both remote users and physical visitors accessing the platform via on-site QR codes (fig. 10). This approach supports transparency and facilitates broader scholarly and public access to the research outcomes



Fig. 10. Entry page and QR code of the "Duklja reimagined" digital museum, available at link: <https://www.encurtador.dev/redireccionamiento/11nq.com/dukjareimagined>
Elaboration by the author.

A central feature of the platform is its interactive spatial interface, which allows users to engage directly with the refined floor plan and aerial imagery. By selecting specific architectural features, users can retrieve layered data including typological classifications, conservation status, historical timelines, and integrated views of the volumetric 3D models (figs. 11-12). This functionality transforms static survey results into a dynamic educational tool, allowing non-linear exploration of the city's fabric. During the Figma prototyping stage, specific care was taken to maintain the structural logic established in the 3D modeling phase. For example, the website's navigation mirrors the urban grid of Duklja, allowing users to move through the digital space with the same topographical accuracy provided by the Google Earth and ArchiCAD integration.



Fig. 11. Example of the drop down menus of the architectural objects. Elaboration by the authors.

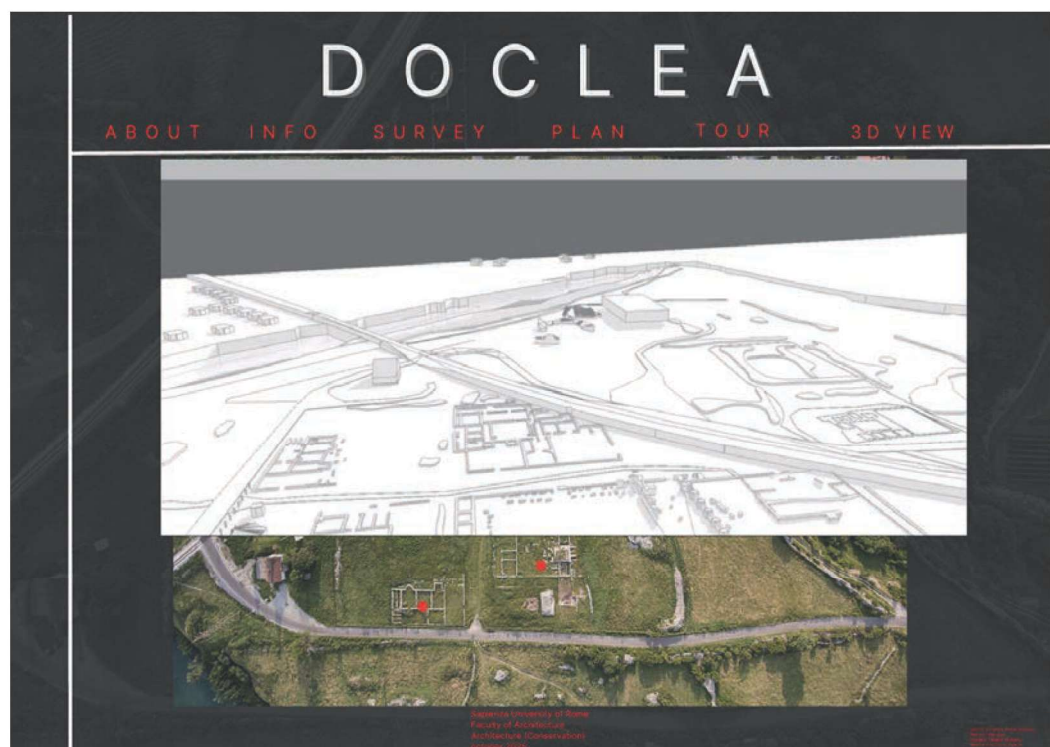


Fig. 12. View of the 3D model animations. Elaboration by the authors.

By digitizing material heritage, the platform transcends physical barriers and environmental degradation, securing a “digital twin” of Duklja that remains accessible to the global scholarly community.

Furthermore, the high-fidelity data, specifically the integrated 3D models, provides conservators with a robust framework for planning future excavations and restoration interventions. Ultimately, this digital infrastructure safeguards the legacy of Duklja, ensuring that its role as a cornerstone of regional cultural identity is preserved through an accessible, data-rich architectural archive.

Conclusion

This study contributes to ongoing debates within digital heritage by demonstrating that meaningful digital representations can be developed even under conditions of limited accessibility and incomplete data. Rather than competing with high-resolution survey-based models, the approach presented here complements them by exploring alternative pathways for knowledge production and dissemination.

In doing so, it reinforces the notion that digital heritage is not solely defined by technological sophistication, but by its capacity to critically engage with data, context, and audience.

Note

[1] The dataset/website is publicly accessible at <https://lnq.com/dukljareimagined>

Reference List

- Addison, A.C., Gaiani, M. (2000). Virtualized architectural heritage: New tools and techniques. In *IEEE Multimedia*, 7(2), pp. 26–31.
- Alberti, L., Koprivica, T. (2017). Joint Archaeological Laboratory Italia–Montenegro: The Doclea Valley. In *Archeologia e Calcolatori*, 28(1), pp. 309–312.
- Alberti, L., Koprivica, T., Burzanović, S., Colosi, F., Cozzolino, M., D'Eredità, A., Gentile, V., Merola, P., Moscati, P., Pelcer-Vujić, O., Sfameni, C. (2018). Progetto Doclea, Montenegro: un'antica città romana da "ri-costruire". In V. Porcari (Ed.), *Proceedings of the 14th International Congress of Heritage's Rehabilitation: The Conservation of Artistic, Architectural, Archaeological and Landscape Heritage – CICOP 2018*, pp. 1186–1200. Naples: Luciano Editore.
- Arheološki muzej Split. Arhiv Luke Jelića, XVI/3.
- Boje, C., Guerriero, A., Kubicki, S., Rezgui, Y. (2020). Towards a semantic construction digital twin. In *Automation in Construction*, 114, 103179. <https://doi.org/10.1016/j.autcon.2020.103179>
- Colosi, F., Merola, P., Moscati, P. (2019). The urban planning of Doclea: Remote sensing and topographical survey. In *Archeologia e Calcolatori, Supplemento*, 11, pp. 59–75.
- Cozzolino, M. (2019). Ground penetrating radar survey. In *Archeologia e Calcolatori, Supplemento*, 11, pp. 77–84.
- Cozzolino, M., Gentile, V. (2019). The urban planning of Doclea: Remote sensing and topographical survey. In *Archeologia e Calcolatori, Supplemento*, 11, pp. 59–75.
- Dokumentacija o istraživanju Duklje (1956, 1957, 1999).
- Gelichi, S., Negrelli, C., Leardi, S., Sabbionesi, L., Belcari, R. (2019). *New Antique Doclea III: Doclea alla fine dell'antichità. Studi e ricerche per la storia di una città abbandonata della Prevalitania / Duklja na kraju antičkog doba*. Bologna.
- Kalezić, Ž., Škatarić, G., Spalević, V. (2024). Archaeological sites in Montenegro: Status and degree of research. In B. Dudić, J. Premović (eds.), *Proceedings of the Fourth International Scientific Conference "Challenges of Modern Economy and Society through the Prism of Green Economy and Sustainable Development" – CESGED 2024*. Novi Sad, September 19–22 2024. Novi Sad: Faculty of Economics and Engineering Management – FIMEK; Educational and Business Center for Development of Human Resources, Management and Sustainable Development.
- Marković, Č. (2006). *Arheologija Crne Gore*. Podgorica: CID.
- Remondino, F., Campana, S. (Eds.). (2014). *3D recording and modelling in archaeology and cultural heritage: Theory and best practices*. Oxford: Archaeopress.
- Sfameni, C., D'Eredità, A. (2019). The main public buildings of Doclea: Archival, archaeological and architectural research. In *Archeologia e Calcolatori, Supplemento*, 11, pp. 85–103.
- Sfameni, C., Koprivica, T. (Eds.). (2020). *Archeologia italiana in Montenegro: storia e prospettive di una cooperazione scientifica*. Rome: Consiglio Nazionale delle Ricerche.
- Sticotti, P. (Ed.), with contributions by L. Jelić, Č. M. Iveković. (1913). *Die römische Stadt Doclea in Montenegro*. Schriften der

Balkankommission, Antiquarische Abteilung, vol. 6. Wien: A. Hölder.

Sylaiou, S., Liarokapis, F., Kotsakis, K., Patias, P. (2010). Virtual museums: A survey. In *Journal of Cultural Heritage*, 10(4), pp. 520–528.

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