

Recording Colonial Traces: The Potential of Digitizing Plantation Sites in West Java as an Effort to Preserve Tangible Cultural Heritage

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Lia Nuralia
**Research Center for Prehistory
and History Archaeology**
**National Research and
Innovation Agency (BRIN)**



INTRODUCTION

- Colonial plantation sites hold significant historical, social, and cultural value.
While many of these sites remain operational today, their tangible cultural heritage is increasingly under threat due to factors such as:
 - modernization,
 - land-use changes, and
 - the lack of comprehensive archaeological documentation.
- This situation underscores the need for innovative approaches to both the preservation and utilization of tangible and intangible cultural heritage.
- Digitization offers a promising solution for safeguarding, utilizing, and promoting public engagement with these heritage assets.

LITERATURE REVIEW

Tangible and Intangible Cultural Heritage:

Focus on both the physical remains of colonial plantation sites—such as buildings, infrastructure, and artifacts—and the intangible heritage embedded in production traditions, labor practices, and the everyday life of plantation communities.

Digital Preservation:

Refers to the process of documenting and visualizing heritage assets in digital formats, including photography, drone-based aerial imagery, video recordings, manual and digital sketches, among others.

The Potential of Digital Technologies (Archaeological-Historical Focus):

- Photogrammetry
- Spatial mapping (GIS-based analysis)
- 3D modeling and reconstruction

Research Gap:

Previous studies on colonial plantation sites in Indonesia have not fully explored or demonstrated the effectiveness of digital preservation methods in ensuring long-term conservation and enhancing public access to cultural heritage.

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METHOD

Research Sites:

- **Malabar Plantation** (Bandung)
- **Cipetir–Sukamaju Plantation** (Sukabumi)
- **Ciater Plantation** (Subang)

Methods Employed:

- Visual documentation (including ground photography, drone-based aerial imagery, video recordings, manual and digital sketching)
- Spatial mapping using Geographic Information Systems (GIS)
- 3D modeling through photogrammetry techniques

Expected Outputs:

- A digital heritage database
- Virtual representations for exhibitions and public interpretation
- Supplementary educational materials for integration into school curricula

Spatial Mapping: Geographic Information System (GIS)

- GIS (Geographic Information System) is a framework for collecting, storing, analyzing, and visualizing data that is geographically referenced.
- It enables users to identify patterns, relationships, and trends through maps, graphs, and analytical reports.

Summary of the GIS Workflow:

- **Data Collection:**
Gathering spatial (location-based) data, such as geographic coordinates, site boundaries, and satellite imagery.
- **Data Input into GIS Software:**
Importing collected data into GIS platforms such as **ArcGIS** or **QGIS** for processing and analysis.
- **Data Processing & Spatial Analysis:**
Applying analytical tools to explore spatial relationships—such as distance, elevation, land-use change, and environmental impact.
- **Visualization:**
Generating interactive and informative digital maps that represent spatial dynamics and heritage distribution.
- **Decision-Making Support:**
GIS outputs serve multiple applications, including spatial planning, disaster risk mitigation, heritage zoning, and land-use mapping.

FINDING AND DISCUSSION

Current Site Conditions:

- Some elements have been digitally documented, including: camera photography, drone aerial imagery, video recordings, manual and digital sketches, scanned historical maps, and archival photographs.
- The potential for further digitization lies in architectural and spatial documentation through the application of spatial mapping (GIS) and 3D modeling (photogrammetry).

Benefits of Digitization:

- Long-term preservation of cultural heritage data
- Public access through virtual platforms
- Enhanced interactivity and engagement with local communities

Challenges:

- Limited human resources (HR capacity)
- Technological constraints in field implementation
- Coordination issues among stakeholders

3D Modeling: Photogrammetry

A technique used to create three-dimensional models of real-world objects or areas by utilizing photographs taken from multiple angles.

Process Summary:

- **Image Acquisition**
 - Capture multiple photographs from various angles (ground-level, drone, or aerial).
 - Ensure consistent lighting and comprehensive coverage of the object or area.
- **Image Matching**

Photogrammetry software (e.g., Agisoft Metashape, RealityCapture) detects common feature points across different images.
- **3D Reconstruction** The identified points are used to generate a 3D structure (point cloud → mesh → textured model).
- **Model Output** The final result is a realistic 3D model, which can be applied in GIS, architectural documentation, heritage conservation, gaming, or virtual reality (VR) environments.

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FINDING AND DISCUSSION

Malabar Plantation (Bandung)

Visual Documentation:

- Ground-level photography
- Drone aerial imagery
- Video recordings
- Digital sketches
- Scanned historical maps
- Scanned archival photographs

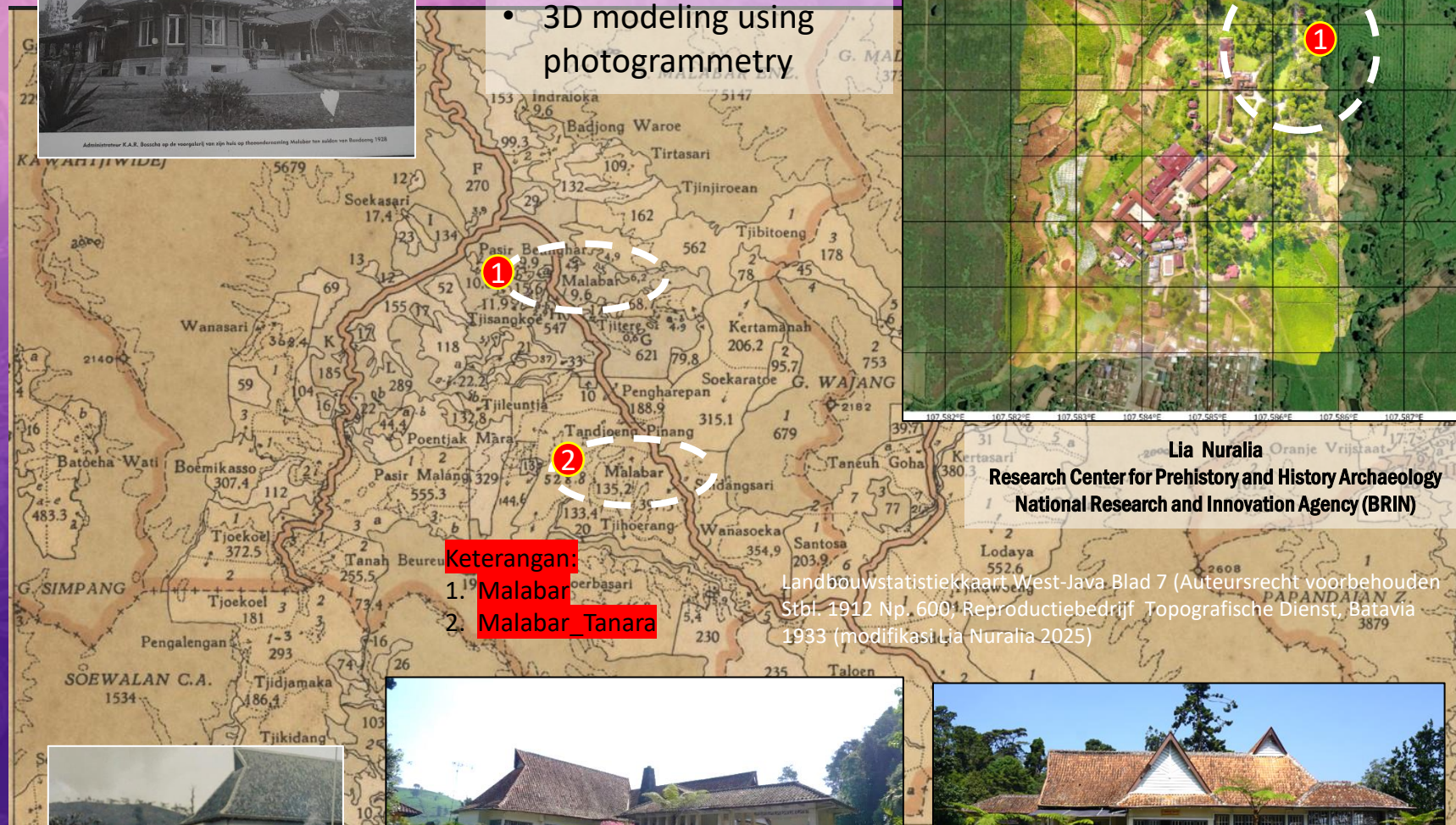
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Digitization Potential:

- Spatial mapping using GIS
- 3D modeling using photogrammetry



Administrateur K.A.B. Batawi op de voorgrond van zijn huis op thans ontbrekende Malabar ten zuiden van Bandung 1928



Keterangan:

1. Malabar
2. Malabar Tanara

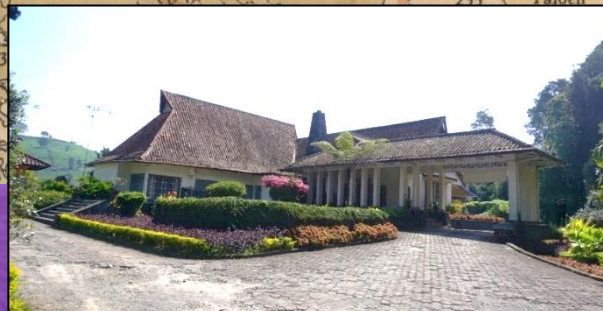
Landbouwstatistiekkaart West-Java Blad 7 (Auteursrecht voorbehouden Stbl. 1912 Np. 600; Reproductiebedrijf Topografische Dienst, Batavia 1933 (modifikasi Lia Nuralia 2025))



2023



(Dok. Kantor Induk Administrasi Perkebunan Malabar; Scanning Photo Lia Nuralia, 2019)



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FINDING AND DISCUSSION

Cipetir_Sukamaju Plantation (Sukabumi)

Visual Documentation:

- Ground-level photography
- Drone aerial imagery
- Video recordings
- Digital sketches
- Scanned historical maps
- Scanned archival photographs

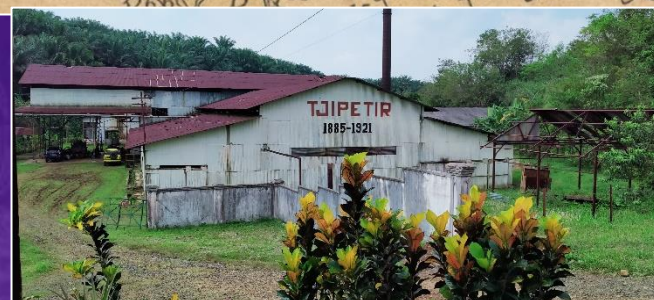
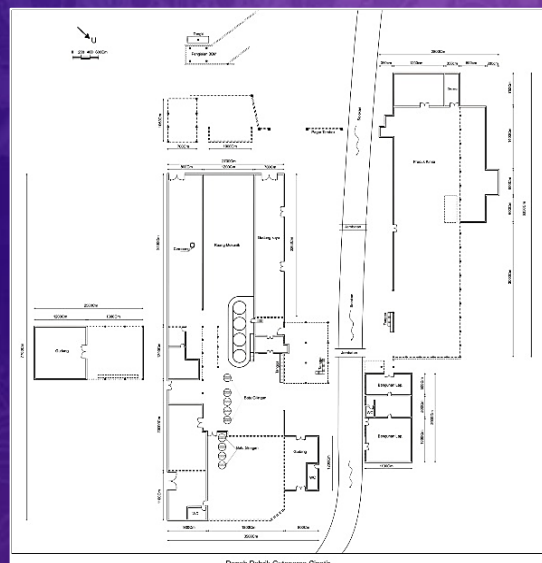
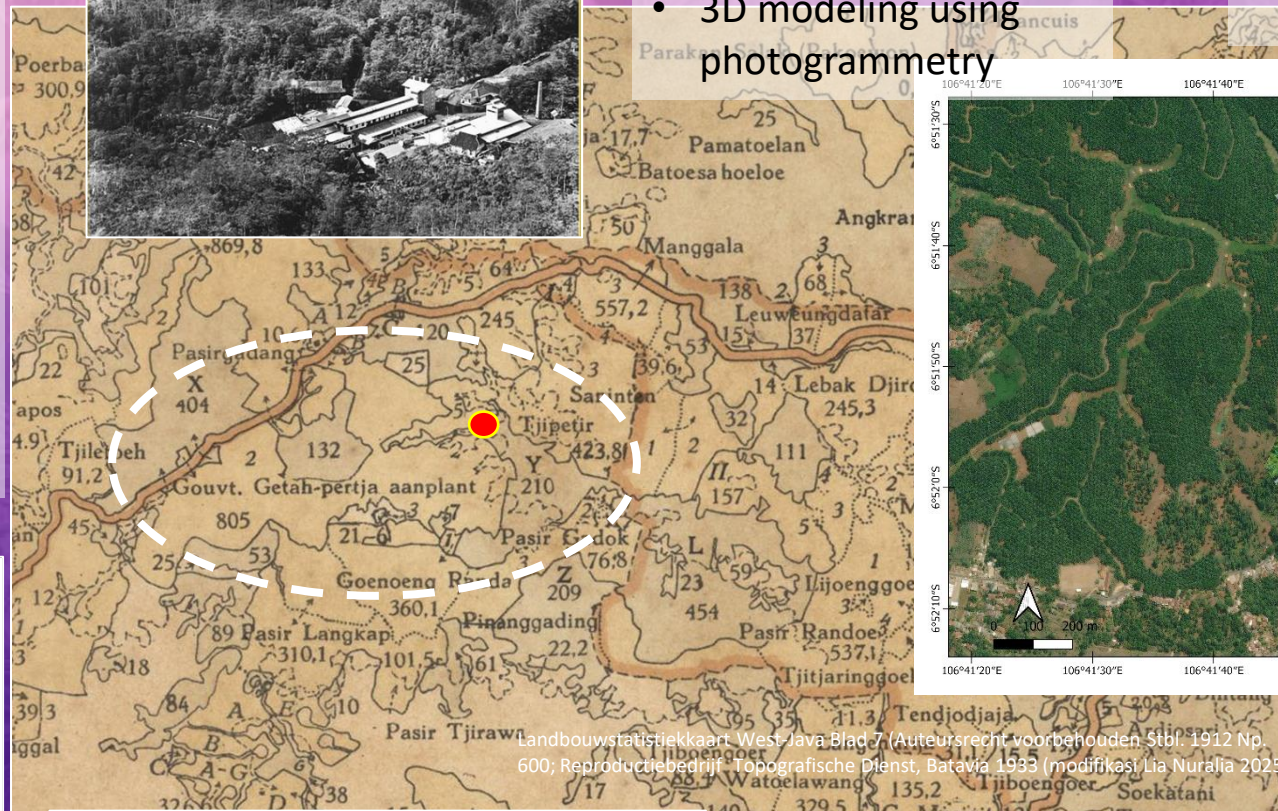
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Digitization Potential:

- Spatial mapping using GIS
- 3D modeling using photogrammetry

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FINDING AND DISCUSSION

Digitalization Potential:

- Spatial mapping using GIS
- 3D modeling using photogrammetry

Perkebunan Ciater (Subang)

Dokumentasi visual:

- Ground-level photography
- Drone Aerial Imagery

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Spatial Mapping using GIS

Digitalization



Pemodelan 3D menggunakan fotogrametri



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FINDING AND DISCUSSION

- **Digitization enables the preservation of heritage sites without relying on their physical condition.**
For example, deteriorating or inaccessible buildings can still be “revived” through 3D models, virtual tours, or online archives.
This opens up opportunities for digital tourism, research, and education—even when the original structures are damaged or access is limited.
- **Through a digital approach, heritage preservation extends beyond physical restoration** to encompass broader uses of historical and cultural value. Sites can become sustainable resources rather than merely old structures. For example:
 - a. Teaching colonial history in schools or through digital museums.
 - b. Promoting heritage tourism via social media or interactive websites.
 - c. Raising public awareness about the importance of preserving local heritage.

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FINDING AND DISCUSSION

Digital heritage preservation requires cross-sector collaboration to be fully optimized:

- Private companies can integrate historical heritage into branding and plantation-based tourism.
- Academics can conduct documentation and research to validate historical narratives.
Governments can provide policy support, incentives, and legal protection.
- Local communities can be involved as historical informants and educational tourism facilitators.
- This collaborative effort can contribute to both local economic development and the preservation of historical values.

Digital technologies ensure that the historical value of a site is not lost, even if its physical condition changes. For example:

- 3D models and digital maps can be stored, shared, and accessed across multiple platforms.
- Augmented Reality (AR) allows visitors to “visualize the past” on-site.
- Digital archives preserve historical information for future generations.
- This approach reinforces utilization-based preservation, ensuring that historical value remains active and productive in the digital era.

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CONCLUSION

- **Digitization is an innovative and effective approach** to preserving colonial plantation heritage sites.
- It expands the scope of conservation from physical restoration to digital and educational engagement.
- Collaboration among private sectors, academia, government, and local communities is essential.
- Technology-based preservation supports the long-term sustainability of historical values in the digital era.

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