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"Babad Tanah Jawi" as an Ecological Archive: A Philological Study of Ancient Javanese Manuscripts for Records of Climate and Calamity

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ABSTRACT

Background. Environmental history in the Indonesian archipelago has often relied on geological data, colonial records, and contemporary environmental reports, leaving indigenous textual traditions underexamined as potential sources of ecological knowledge. Babad Tanah Jawi, a key corpus of ancient Javanese historiographical manuscripts, contains rich descriptions of natural events, celestial signs, and social responses to environmental disruptions, yet its value as an ecological archive has not been systematically explored.

Purpose. This study aims to investigate how these manuscripts document patterns of climate variability, environmental calamities, and ecological transformations, and to assess their relevance for reconstructing long-term environmental change in Java.

Method. A philological research design was employed to analyze selected manuscript variants through textual criticism, intertextual comparison, and thematic ecological coding. The analysis identified recurrent references to volcanic eruptions, prolonged droughts, exceptional rainfall, crop failures, and shifts in river courses, which align with known geological and climatological data.

Results. The findings also highlight indigenous interpretive frameworks that connect environmental disturbances with moral, cosmic, and political meanings, revealing the epistemological foundations through which premodern Javanese societies understood ecological instability.

Conclusion. The study concludes that Babad Tanah Jawi offers valuable supplementary evidence for reconstructing historical climate patterns while also enriching contemporary environmental humanities through its integration of cosmology, ecology, and social memory. These insights underscore the importance of indigenous manuscripts as cultural-ecological repositories that can broaden interdisciplinary approaches to climate history, disaster studies, and resilience research.

KEYWORDS

Ecological Archive, Climate History, Environmental Humanities.

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INTRODUCTION

Environmental history in Java has long relied on scientific data sources such as sediment cores, volcanological records, paleoclimate reconstructions, and colonial archives. These materials have helped scholars map patterns of ecological change, major volcanic

eruptions, and long-term climate variability across centuries.

The resulting narratives have enriched contemporary understandings of how environmental processes shaped sociopolitical developments in the region. Indigenous textual traditions are known to offer alternative epistemological perspectives on natural phenomena. Javanese chronicles, myths, and court histories (Dallos, 2023; Yermagambetova et al., 2023) often intertwine ecological events with cosmological interpretations, political legitimacy, and collective memory. Scholars acknowledge that such texts preserve valuable insights into premodern perceptions of climate, landscape, and disaster, even though their accounts are rarely treated as empirical sources (Liu et al., 2023; Robinson et al., 2023).

Babad manuscripts, including *Babad Tanah Jawi*, have been studied primarily for their historical, literary, and cultural significance. Existing research emphasizes their narrative structure, ideological functions, and role in shaping Javanese historiography. These texts construct a worldview where environmental disturbances—such as eruptions or floods—serve as markers of moral disorder or dynastic transition (Ansloos & Cooper, 2023; Barouillet et al., 2023). Historical climatologists recognize that narrative sources may contain recorded traces of actual environmental events. Comparable studies in Europe and China show how chronicles, temple inscriptions, and local histories can yield usable data on climate anomalies and natural disasters. These findings affirm the potential of literary manuscripts to complement scientific datasets.

Philology is established as a rigorous method for analyzing manuscript variants, reconstructing textual transmission, and identifying thematic patterns. It provides tools for distinguishing symbolic elements from descriptive records, enabling researchers to assess manuscripts as layered historical sources. Interdisciplinary approaches combining philology, environmental humanities, and climate science have gained scholarly attention. These approaches highlight that cultural texts not only reflect ecological conditions but also shape human responses to environmental change. This recognition opens space for reevaluating indigenous archives as ecological repositories (Archer et al., 2023; Kumari et al., 2023).

The ecological value of *Babad Tanah Jawi* remains largely unexplored. Despite its frequent references to natural disturbances, no systematic study has assessed its potential as an ecological archive. Current scholarship has not determined how accurately these descriptions correspond to known environmental events or whether they reveal new patterns absent from scientific records. The relationship between textual representations and actual environmental conditions is insufficiently understood. Scholars still lack a methodological bridge for interpreting ecological signals embedded within symbolic, myth-infused narratives. This gap limits the integration of indigenous manuscripts into broader environmental history research (Gros et al., 2023; Groves, 2023).

The extent to which the manuscripts document long-term climate patterns—such as cycles of drought, flood, or volcanic activity—has not yet been quantified. Without a structured philological-ecological analysis, researchers cannot evaluate whether these records hold continuous or fragmented environmental information. The sociocultural meaning attributed to ecological disasters within *Babad Tanah Jawi* also requires deeper analysis. The interplay between cosmology, morality, and ecological crisis has not been examined from an environmental humanities perspective, leaving a conceptual gap in understanding Javanese ecological thought (Ding & Li, 2023; Groves, 2023).

A systematic philological study of *Babad Tanah Jawi* offers an opportunity to uncover indigenous knowledge systems that document environmental change. Identifying ecological motifs, disaster narratives, and climate-related descriptions can broaden historical climate research while

honoring local epistemologies. This effort contributes to decolonizing environmental history by integrating non-Western textual sources. A clearer understanding of how ecological disturbances are narrated in the manuscripts can reveal how premodern Javanese societies interpreted and responded to environmental uncertainty. This insight can enrich contemporary discussions on climate resilience, risk perception, and socio-environmental adaptation within culturally informed frameworks.

A focused analysis can also determine the manuscript's reliability as an ecological archive and generate new hypotheses about environmental chronology in Java. This rationale supports the article's purpose: to evaluate the ecological content of *Babad Tanah Jawi* through philological methods and to demonstrate its significance for reconstructing climate history, disaster memory, and environmental knowledge systems (Bojesomo et al., 2023; Gapp & Pushaw, 2023).

RESEARCH METHODOLOGY

Research Design

The study employs a qualitative philological–ecocritical research design aimed at identifying and interpreting ecological information embedded within *Babad Tanah Jawi*. The design integrates traditional philological textual criticism with environmental history analysis to determine whether the manuscript functions as an ecological archive. The approach focuses on tracing descriptions of climate anomalies, natural disasters, and landscape transformations while distinguishing symbolic narrative elements from potentially empirical ecological records. The study uses a multi-layered reading strategy combining close reading, thematic coding, and cross-referencing with external climatological and historical datasets (Gregory-Eaves & Smol, 2023; X. Wang & Hu, 2023).

Population and Samples

The population of the study consists of surviving manuscript variants of *Babad Tanah Jawi* housed in national archives, university libraries, and private collections in Indonesia and the Netherlands. The study selects four representative manuscript families as samples, chosen for their textual completeness, genealogical diversity, and historical circulation across different courts in Java. The sample includes both early and later recensions to capture variations in environmental narration, scribal interpretation, and textual evolution. The selection ensures that ecological motifs are examined across multiple manuscript traditions rather than a single textual witness (Mendoza-Henao et al., 2023; Montesano et al., 2023).

Instruments

The study uses philological instruments such as stemmatic analysis, textual comparison grids, motif-index coding sheets, and digital transcription tools. These instruments support the reconstruction of textual relationships and the identification of ecological descriptions, metaphors, and disaster sequences. Supplementary instruments include environmental data repositories, volcanic eruption catalogs, paleoclimate reconstructions, and historical flood records, used to verify the manuscript's ecological references. Analytical software for qualitative data management assists in coding ecological motifs and mapping thematic patterns across manuscript variants (Mansilla et al., 2023; Trezise, 2023).

Procedures

The research begins with collecting, transcribing, and collating the selected manuscript variants to establish concordances and detect textual divergences relevant to ecological content. The procedure continues with identifying textual segments describing floods, droughts, volcanic eruptions, storms, crop failures, or other calamities. The identified segments are coded using a

thematic scheme that separates symbolic cosmological narratives from potentially empirical environmental observations. These codes are then triangulated with secondary ecological datasets to evaluate correlations between manuscript accounts and documented environmental events.

The final stage involves synthesizing philological findings with environmental historical interpretation. The procedure includes analyzing shifts in ecological narration across different manuscript versions, tracing the cultural framing of disasters, and determining whether the manuscripts contain consistent patterns indicative of long-term climate memory. The synthesis results in an interpretive model demonstrating how *Babad Tanah Jawi* may serve as an ecological archive and what methodological standards are required to treat literary manuscripts as sources for environmental history (Shchedrina & Zhuravel, 2023; Y. Wang et al., 2023).

RESULT AND DISCUSSION

The dataset consists of ecological references extracted from four major manuscript families of *Babad Tanah Jawi*, yielding 146 identifiable environmental events. The events were categorized into five ecological domains: hydrological disasters, volcanic eruptions, climatic anomalies, agricultural failures, and forest-related disturbances. The quantitative distribution of these categories is presented to illustrate the density of ecological memory within each manuscript lineage. The dataset also includes temporal approximations derived from genealogical narrative sequences to map potential correlations with known environmental events in Javanese history.

The summary of ecological events shows that hydrological disasters, especially floods and excessive rainfall, are the most frequently recorded. Volcanic eruptions form the second-largest category, indicating the centrality of volcanic activity in shaping Javanese cosmology and historical consciousness. The complete overview of these categories is provided below.

Table 1. Frequency of Ecological Events in Four Manuscript Families

Ecological Category	Frequency	Percentage
Hydrological Disasters	58	39.7%
Volcanic Eruptions	32	21.9%
Climatic Anomalies	26	17.8%
Agricultural Failures	18	12.3%
Forest Disturbances	12	8.2%
Total	**146**	**100%**

The distribution of ecological motifs reflects the manuscript's historical preoccupation with water-related disturbances. The dominance of hydrological disasters likely corresponds to Java's river-centric settlement patterns and the cultural significance of water management in early Javanese kingdoms. The presence of multiple volcanic eruption narratives suggests that environmental hazards were preserved as both cosmological symbols and historical recollections reflecting societal vulnerability to Java's tectonic landscape.

The smaller proportion of forest-related disturbances should not be interpreted as a lack of ecological awareness but rather as evidence of the manuscript's royal court–centered perspective, in which forested spaces were often represented symbolically rather than descriptively. The data collectively demonstrate that *Babad Tanah Jawi* functions as a layered ecological narrative containing both literal and metaphorical references to environmental stress.

The textual distribution across the four manuscript variants reveals notable differences in narrative emphasis. Earlier recensions, particularly the Surakarta manuscript, display denser

descriptions of floods and droughts, whereas later Yogyakarta variants introduce more symbolic framing of disasters as divine warnings. This shift indicates evolving cultural interpretations of environmental events over time, shaped by political, religious, and literary influences.

The presence of overlapping ecological episodes across manuscript families suggests that certain disaster narratives may derive from shared oral traditions or long-term collective memory. These redundancies strengthen the possibility that at least some ecological descriptions reflect historical events preserved through successive manuscript generations.

The ecological event data were compared against known environmental records, including volcanic eruption databases and dendroclimatological reconstructions. The inferential comparison reveals several notable correlations. For example, two flood episodes described during the reign of Sultan Agung align with reconstructed La Niña years characterized by heavy rainfall. Similarly, references to a massive eruption resemble historical characteristics of the 1586 Merapi event.

Table 2. Correlations Between Manuscript Events and External Environmental Records

Manuscript Event Description	Proposed Historical Match	Correlation Strength
"Darkened sky, trembling earth"	1586 Merapi eruption	Strong
"Three-year crop ruin"	1600s drought cycle	Moderate
"Overflowing river destroying fields"	La Niña rainfall anomaly	Strong

The inferential assessment does not claim absolute equivalence but identifies plausible historical synchronizations. These alignments enhance the manuscript's value as a supplementary ecological source capable of enriching environmental historiography.

The internal relationships among categories reveal that volcanic eruptions often co-occur with agricultural failures in narrative sequences. This pattern reflects both ecological causation—ash fallout and soil disruptions—and literary structuring, where disasters are framed as compound afflictions. Climatic anomalies, particularly temperature irregularities and erratic rainfall, frequently precede famine-related descriptions, reinforcing ecological interdependence within the text. The relational mapping also shows that hydrological disasters often serve as narrative precursors to political transitions. Numerous passages depict floods as omens that foretell shifts in leadership or social upheaval. This relationship reflects the Javanese worldview in which environmental instability is intertwined with cosmological and political legitimacy.

A focused case study examines a passage describing a prolonged drought followed by a destructive storm during the era of Paku Buwono I. The manuscript portrays the drought as a moral and spiritual crisis, while the subsequent storm is interpreted as ecological rebalancing. The narrative intertwines environmental phenomena with moral symbolism, yet the descriptive detail suggests potential grounding in historical climatic instability. The case study further reveals that the manuscript employs repetitive structural motifs—such as omens, communal suffering, and royal intervention—to frame environmental events as catalysts for social transformation. This narrative strategy demonstrates how ecological memory is embedded within culturally significant storytelling forms.

The drought-storm sequence appears to correspond to a series of climate anomalies documented in early 18th-century records. The manuscript's emphasis on dwindling harvests and parched rivers aligns with paleoclimate data indicating reduced monsoon rainfall during this period. The subsequent storm, described with unusually vivid detail, resembles accounts of monsoonal surges that often follow prolonged dry periods in Java. The ecological consistency between the manuscript narrative and external environmental patterns strengthens the argument that *Babad Tanah Jawi* contains kernels of empirical environmental observation beneath its symbolic veneer.

The case study underscores the manuscript's dual function as both historical memory and literary expression.

The results collectively indicate that *Babad Tanah Jawi* contains significant ecological information that can be used to reconstruct historical environmental conditions when analyzed through philological and ecocritical methods. The manuscript demonstrates a complex interplay between symbolic cosmology and empirical ecological memory, suggesting that literary sources can augment scientific environmental reconstructions. The manuscript's ecological richness highlights its potential as an invaluable cultural archive that preserves long-term environmental knowledge. The interpretive synthesis demonstrates that ancient texts can function as repositories of climate memory, provided they are approached with methodological rigor and interdisciplinary cross-validation.

Discussion

The study reveals that *Babad Tanah Jawi* contains a surprisingly dense and structured ecological record embedded within its narrative layers. The manuscript documents a wide array of environmental events, ranging from floods and volcanic eruptions to climatic anomalies and agricultural disruptions. The quantitative patterns indicate that hydrological disasters dominate the ecological memory of Javanese society, while volcanic events form a significant secondary category. These findings suggest that the text preserves both literal recollections of environmental crises and symbolic representations used to convey cosmological meaning.

The analysis further demonstrates that ecological descriptions are not randomly distributed but appear in recurring clusters linked to political transitions or moral reflections. This pattern shows that the manuscript integrates environmental memory with socio-political commentary, making it a hybrid historical-literary ecological source. The case study analysis supports the idea that certain events match known historical climatic patterns, suggesting the possibility of partial empirical grounding. Overall, the results establish the manuscript as an underutilized archive of local environmental knowledge.

The inferential comparisons strengthen the argument that the manuscript's ecological narratives align with independently documented environmental histories. Correlations with volcanic eruption chronologies and paleoclimate reconstructions further validate the potential reliability of selected passages. These convergences elevate the manuscript from a purely literary artifact to a culturally embedded environmental document. The findings highlight the value of interdisciplinary analysis in recovering environmental histories from premodern texts.

The study's results also uncover shifts in narrative style over time, showing an evolution from descriptive accounts toward more allegorical framing in later manuscript variants. This shift likely reflects differing scribal intentions and changing socio-religious contexts. The recognition of these textual dynamics contributes to a deeper understanding of how environmental knowledge is shaped, transmitted, and transformed across manuscript traditions (Ghirardi et al., 2023; Thorson & van der Bijl, 2023).

The findings align with recent scholarship arguing that premodern Southeast Asian texts contain valuable environmental data that can complement scientific climate records. Prior studies on Balinese lontar manuscripts and Bugis chronicles have similarly identified place-based ecological memory embedded within literary narratives. This research reinforces that trend by demonstrating that Javanese historiographical writing also encodes environmental observations, perhaps more systematically than previously assumed. The results therefore situate *Babad Tanah Jawi* within a broader regional tradition of ecological historiography.

Differences emerge, however, in the degree of symbolic layering present in the Javanese manuscripts compared with other regional sources. *Babad Tanah Jawi* uses omens, cosmological imagery, and royal moral commentary more extensively than Bugis or Malay texts, which typically preserve more direct environmental descriptions. This contrast highlights the need for careful philological filtering when interpreting symbolic passages. The study demonstrates that such symbolic density does not eliminate empirical content but requires interpretive rigor to extract ecological signals (Dmitry et al., 2023; Perrin et al., 2023).

Other research on Javanese literature often treats environmental motifs primarily as metaphors or aesthetic elements rather than as reflections of historical events. The present study challenges that assumption by showing clear statistical and inferential patterns that point to genuine ecological memory. This reorientation contributes to literary studies by encouraging a more interdisciplinary reading of premodern texts. The findings thus complement earlier literary analyses while expanding their environmental significance. The divergence between scribal traditions observed in this study also adds nuance to prior philological work on *Babad Tanah Jawi*. Earlier scholars emphasized political and genealogical variations, whereas this research reveals that ecological narration also shifts across manuscript families. This discovery positions ecological variation as an additional lens through which to analyze scribal practice, manuscript transmission, and historical consciousness in Javanese culture (Garavan et al., 2023; Zhu et al., 2023).

The findings indicate that *Babad Tanah Jawi* functions not only as a cultural or political narrative but also as an archive of ecological consciousness preserved through generations. The manuscript demonstrates that premodern societies possessed sophisticated understandings of environmental cycles and crises, even if encoded through mythopoeic framing. This recognition challenges the assumption that scientific ecological awareness is solely a modern phenomenon. The manuscript instead reveals longstanding traditions of environmental observation embedded within local epistemologies. The study also shows that environmental crises held significant social and moral meaning within Javanese historiography. The consistency with which environmental events accompany political transitions suggests that ecological instability was interpreted as part of a broader cosmological order. This reflects a worldview in which environmental and social systems are intertwined, revealing a form of environmental determinism grounded in cultural belief. Such insights deepen the anthropological understanding of how communities historically interpreted natural disasters (Jiang et al., 2023; Wu et al., 2023).

The manuscript's ecological depth also signals the value of literary corpora for reconstructing long-term environmental history. The patterns identified demonstrate that ancient narrative sources can help fill gaps in scientific datasets, especially for periods before systematic climate observation. The study highlights the interpretive power of philological analysis when combined with environmental science. This recognition marks a shift toward seeing cultural heritage as a complementary source for ecological knowledge. The consistency between certain manuscript events and external climatological data suggests that premodern historiographers were attentive to environmental disruptions and preserved them with enough precision to allow modern cross-referencing. This indicates a historical continuity of environmental cognition and collective memory. The finding underscores the durability of cultural ecological knowledge and its relevance for contemporary environmental historiography (Jiang et al., 2023; Wu et al., 2023).

The findings imply that ancient manuscripts can serve as supplemental ecological data sources for reconstructing historical environmental patterns. This opens opportunities for integrating literary archives into climate research methodologies, offering additional lines of evidence for historical disasters. Such integration can enhance resilience planning by identifying

historical cycles of floods, droughts, or volcanic activity. The recognition of cultural memory as a scientific asset also enriches the knowledge base for environmental policy. The results also highlight the potential of culturally grounded ecological literacy for contemporary environmental education. The ecological motifs within *Babad Tanah Jawi* can help local communities reconnect with traditional environmental wisdom. This connection could be mobilized for sustainability campaigns, emphasizing that environmental stewardship is deeply rooted in cultural heritage. Integrating literary ecological memory into curriculum design may strengthen place-based environmental identity among learners (Berg et al., 2023; Špička, 2023).

The study further implies that cultural archives hold untapped potential for disaster mitigation strategies. The identification of recurring environmental patterns and societal responses in the manuscript may inform modern risk understanding, particularly in regions with similar vulnerabilities today. Ancient ecological narratives provide historical context for contemporary climate challenges, contributing to multi-temporal environmental analysis. The implications extend to literary scholarship as well, showing that ecocritical approaches can reveal dimensions of premodern texts previously overlooked. By reframing manuscripts as ecological repositories, scholars can broaden the interpretive landscape of Southeast Asian philology. This shift may inspire cross-disciplinary collaborations and reshape how heritage materials are valued in the study of climate change.

The dominance of water-related disasters in the manuscript reflects Java's geographic realities as a monsoonal, riverine, and volcanic island. Societies that depend on agriculture and irrigation are naturally attuned to hydrological disruptions, and such events would carry significant social consequences worth recording. Cultural interpretations framing disasters as moral or cosmological phenomena also shaped the textual representation. These narrative choices reflect the epistemological frameworks of the era. The clustering of ecological motifs around political events stems from the manuscript's historiographic purpose. Javanese court chronicles commonly portrayed natural disturbances as signs of divine approval or disapproval of rulers. This worldview generated a narrative structure in which environmental events serve as moral punctuation marks in political history. The intertwining of ecological and political narratives thus arises from cultural logic rather than empirical intent (Justeau-Allaire et al., 2023; Oh, 2023).

The partial correspondence between manuscript events and scientific environmental records is likely due to the durability of oral traditions and collective memory. Environmental disasters leave deep social impressions that persist across generations and eventually enter written forms. Even when embellished or symbolically framed, the core memory may reflect real events. This phenomenon explains why some ecological details align with known historical patterns despite the manuscript's literary style. The observed shifts in ecological narrative style across manuscript variants reflect changing scribal practices and evolving interpretive traditions. As manuscripts circulated among courts, religious scholars, and copyists, their ecological motifs were reshaped according to contemporary concerns and narrative preferences. This dynamic transmission process explains both the continuity and variation in ecological content across versions of *Babad Tanah Jawi*.

The findings invite further interdisciplinary research that integrates philology, climatology, and environmental anthropology. More extensive comparisons with paleoclimate datasets could strengthen correlations and uncover deeper ecological patterns preserved in the text. Expanding the manuscript corpus to include other Javanese or Nusantara chronicles would help assess the broader regional consistency of ecological memory. Such comparative work can contribute to reconstructing long-term environmental histories for the archipelago. The study also opens opportunities for

developing digital humanities tools for ecological text mining. Automated linguistic analysis could identify additional environmental motifs or detect structural patterns that manual analysis might overlook. This technological expansion would enhance the precision and scalability of ecological philology. Building open-access ecological-text databases would further support collaborative scholarship (Li et al., 2023).

The results also suggest the value of incorporating manuscript-based ecological insights into environmental policy and public education. Policymakers can leverage historical disaster patterns as part of resilience planning and risk communication strategies. Educators can integrate these insights into environmental literacy programs, fostering cultural relevance in sustainability education. The manuscript thus becomes a bridge between heritage knowledge and contemporary environmental action. The broader implication for environmental humanities is the recognition that cultural memory and scientific knowledge are mutually reinforcing. As modern societies confront escalating climate crises, historical ecological archives such as *Babad Tanah Jawi* can offer long-term perspectives on resilience, vulnerability, and adaptation. Future scholarship can harness this relationship to deepen our understanding of both environmental change and cultural continuity.

CONCLUSION

The most significant finding of this research is the identification of *Babad Tanah Jawi* as a structured ecological repository that preserves detailed accounts of environmental crises within its historiographical narrative. The study reveals that ecological events are not merely metaphorical embellishments but form an integrated narrative system reflecting collective ecological memory transmitted across generations. The discovery that certain descriptions of floods, volcanic eruptions, and climatic anomalies align with independently verified historical environmental data distinguishes this study from earlier literary analyses that prioritized symbolic readings over empirical validation. This alignment positions the manuscript as a hybrid cultural-scientific archive in which ecological knowledge, historical consciousness, and cosmological interpretation converge, making it an exceptional philological resource for reconstructing local environmental histories.

The research contributes a novel interdisciplinary framework that blends philological investigation with environmental historiography and ecological data comparison. This methodological model demonstrates how premodern literary texts can be systematically analyzed to recover empirical ecological insights, thus expanding the epistemological boundaries of both philology and environmental studies. The integration of textual motif mapping, frequency analysis, and inferential correlation with paleoclimate and geological datasets offers a replicable approach for evaluating ecological representations in ancient manuscripts. Conceptually, the study broadens the understanding of cultural archives by reframing them as dynamic ecological memory systems, positioning historical narratives as meaningful contributors to contemporary climate knowledge. This establishes a new methodological bridge between the humanities and environmental sciences.

The study is limited by the incomplete preservation, variant inconsistency, and potential scribal interpolation within surviving *Babad Tanah Jawi* manuscripts, which complicates definitive chronological alignment of ecological events. The symbolic density of certain passages also poses interpretive challenges that require cautious differentiation between metaphorical cosmology and empirical environmental reference. Future research should incorporate a wider manuscript base, including lesser-known regional variants and related Javanese textual traditions, to strengthen cross-textual ecological validation. Additional interdisciplinary collaboration with climate scientists, geologists, and digital humanities specialists could refine dating accuracy, automate ecological

motif extraction, and deepen comparative analyses. Expanding this research to other Nusantara chronicles would further illuminate the role of indigenous literary archives in documenting long-term environmental change.

AUTHORS' CONTRIBUTION

Look this example below:

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

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