



PRESERVING NIAS LANGUAGE, SUSTAINING CULTURAL IDENTITY: A SYSTEMATIC LITERATURE REVIEW ON LOCAL HERITAGE SUSTAINABILITY

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ABSTRACT

The Nias language and its cultural heritage face growing pressures from globalization, modernization, and changing generational values, while research on preservation efforts remains fragmented. This systematic literature review synthesizes studies examining the relationships between Nias language preservation, cultural identity, and heritage sustainability. Using PRISMA guidelines, peer-reviewed articles, conference papers, and scholarly book chapters published over the past two decades were systematically identified and analyzed through predefined inclusion criteria and independent screening procedures. The review identified five major research themes: linguistic revitalization, indigenous knowledge integration in STEM education, traditional practices such as Hombo Batu in character education, preservation of traditional architecture, and ecological literacy based on local wisdom. Findings show that effective preservation strategies integrate community-based language initiatives with formal education, while digital documentation requires stronger institutional support. Cultural identity functions as both a driver and outcome of heritage sustainability. This review contributes an interdisciplinary framework to support evidence-based cultural preservation policies and future research.

INTRODUCTION

The island of Nias, located off the western coast of Sumatra, Indonesia, is home to a distinct cultural and linguistic heritage that has evolved over millennia. The Nias language, as part of the Northwest Sumatra–Barrier Islands subgroup of the Austronesian language family, plays a crucial role in the transmission of indigenous knowledge, oral traditions, and social values within its community. This linguistic framework facilitates the sharing of cultural narratives and practices, reflecting the broader principles of language evolution that adapt to the communicative needs of its speakers [1];[2]. Furthermore, the preservation of traditional knowledge, particularly among women as custodians of cultural practices, underscores the importance of language in maintaining social structures and expertise within the Nusantara region [3]. Such dynamics illustrate how indigenous languages like Nias not only serve as communication tools but also as vital vessels for cultural continuity and identity, essential for the community's resilience against external influences [4].

This linguistic system is deeply intertwined with the community's unique architectural practices, such as the construction of omo hada traditional houses, and with ritual performances like the stone-jumping ceremony known as Hombo Batu[5]. For centuries, these elements formed a cohesive cultural ecosystem that sustained the identity of the Nias people. However, the accelerating forces of globalization, national language

policies favoring Bahasa Indonesia, and the pervasive influence of digital media have placed this heritage under unprecedented strain [6]. Younger generations increasingly adopt Indonesian or English as their primary languages of communication, leading to a documented decline in intergenerational transmission of the Nias language [7]. This linguistic erosion is not an isolated phenomenon; it is accompanied by a gradual detachment from traditional practices, a transformation of built environments, and a weakening of the ecological knowledge embedded in local customs.

The challenges facing Nias heritage are emblematic of broader trends observed in minority language communities worldwide, where the loss of a language often precipitates the disappearance of an entire worldview [8]. Research on language endangerment has consistently demonstrated that when a community shifts away from its ancestral tongue, it simultaneously loses access to unique conceptual frameworks for understanding nature, social relations, and spirituality [9]. In the Nias context, this loss is particularly acute because the language encodes specific knowledge about sustainable resource management, traditional medicine, and architectural techniques that have proven resilient to environmental challenges over centuries [10]. The preservation of the Nias language, therefore, is not merely a linguistic concern but a prerequisite for maintaining the broader cultural and ecological sustainability of the region. Despite the urgency of this situation, the academic literature on Nias heritage preservation has developed in a fragmented manner, with studies often focusing on isolated aspects—such as linguistic documentation, architectural conservation, or educational integration—without examining how these dimensions interact and reinforce one another [11].

A significant research gap exists in the systematic synthesis of knowledge across these disparate domains. While individual studies have provided valuable insights into specific preservation strategies, such as the development of Nias language teaching materials for primary schools [12] or the documentation of traditional building techniques [13] there has been no comprehensive effort to map the interconnections between linguistic vitality, cultural identity formation, and heritage sustainability. Furthermore, the literature lacks a critical assessment of how globalization and digital transformation simultaneously threaten and offer new opportunities for heritage preservation in Nias [11]. This gap is particularly problematic for policymakers and community leaders who require evidence-based guidance on designing integrated interventions that address multiple facets of heritage simultaneously. Without a holistic understanding, preservation efforts risk being piecemeal, duplicative, or even counterproductive if they fail to account for the complex socio-cultural dynamics at play.

The motivation for this systematic literature review, therefore, arises from the need to consolidate and critically evaluate the existing body of research on Nias language preservation, cultural identity, and local heritage sustainability. We aim to provide a comprehensive map of the current state of knowledge, identifying dominant research themes, methodological approaches, and reported outcomes across studies. By synthesizing findings from linguistic, educational, architectural, and ecological perspectives, we seek to uncover the underlying mechanisms through which language preservation supports cultural identity and, in turn, contributes to the sustainability of tangible and intangible heritage. This review is significant because it offers the first integrated framework for understanding Nias heritage as a dynamic system rather than a collection of isolated elements. The findings will be of value to researchers seeking to situate their work within a broader context, to educators developing culturally responsive curricula, to conservationists planning heritage management strategies, and to community members advocating for the revitalization of their ancestral traditions.

The remainder of this paper is organized as follows: Section 2 describes the systematic methodology employed, including the search strategy, inclusion criteria, and data extraction procedures. Section 3 presents the results of the review, organized into eight thematic subsections that cover research trends, linguistic preservation and revitalization, integration of local wisdom in STEM education, cultural identity formation through Hombo Batu, architectural heritage and sustainable building practices, ecological literacy based on indigenous knowledge, globalization challenges and cultural resilience strategies, and digital transformation in heritage documentation. Section 4 discusses the synthesized findings, highlighting cross-cutting themes, identifying gaps in the literature, and proposing directions for future research. Section 5 concludes the paper by summarizing the key contributions and their implications for policy and practice..

METHOD

This study employed a systematic literature review (SLR) design to synthesize and critically evaluate research on the interrelationships among Nias language preservation, cultural identity, and local heritage sustainability. The review followed established systematic review procedures to ensure methodological rigor, transparency, and reproducibility in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines [14]

The review protocol was developed prior to data collection and specified the research questions, search strategy, inclusion and exclusion criteria, and data extraction procedures. A comprehensive literature search was conducted across four major databases and search engines: Scopus, Web of Science, ScienceDirect, and Google Scholar. These databases were selected because of their broad interdisciplinary coverage of linguistics, education, cultural studies, environmental sustainability, and indigenous knowledge research. Google Scholar was additionally used to identify grey literature, conference proceedings, and non-indexed publications.

Search strings were constructed using combinations of keywords and Boolean operators related to “Nias language,” “Bahasa Nias,” “Li Niha,” preservation, revitalization, sustainability, cultural identity, and heritage. The search was limited to publications published between 2018 and 2024 to capture recent scholarly developments. Only English-language publications were included to ensure accessibility and consistency in analysis.

The review was guided by seven thematic research areas: (1) linguistic preservation and revitalization; (2) integration of local wisdom into science and STEM education; (3) cultural identity formation and character education through *Hombo Batu*; (4) architectural heritage and sustainable building practices; (5) ecological literacy and indigenous environmental sustainability; (6) globalization challenges and cultural resilience; and (7) digital transformation in cultural heritage documentation.

Studies were included if they focused on Nias language, culture, or heritage preservation and were published as peer-reviewed journal articles, conference proceedings, or scholarly book chapters. Review articles, editorials, surveys, meta-analyses, and studies lacking sufficient empirical relevance were excluded.

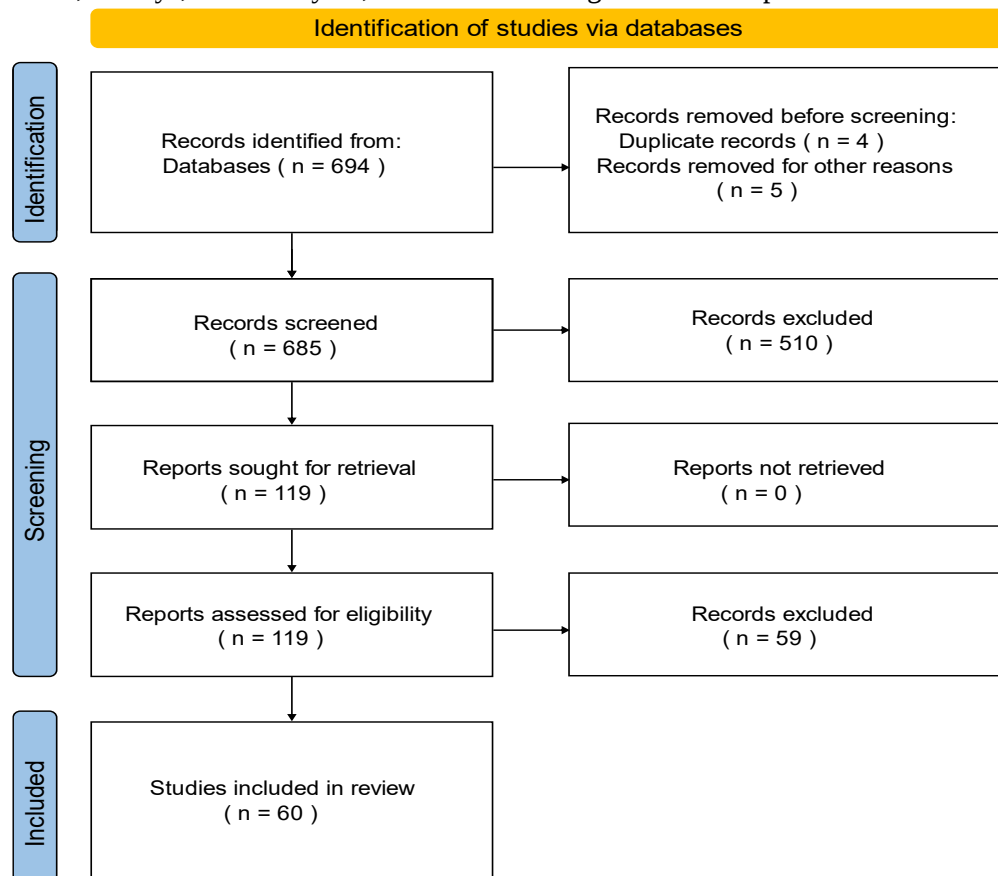


Figure 1. PRISMA flowchart of the study selection process

The study selection process followed PRISMA procedures. The initial database search yielded 694 records. After removing duplicates and incomplete records, 685 studies were screened based on titles and abstracts by two independent reviewers. A total of 510 records were excluded during preliminary screening. The remaining 119 full-text studies were assessed for eligibility, resulting in the exclusion of 59 studies that did not satisfy the inclusion criteria. Ultimately, 60 studies were included in the final synthesis.

Data extraction focused on publication characteristics, thematic focus, methodological approach, and key findings. Thematic synthesis was employed to identify recurring patterns, conceptual relationships, and emerging interdisciplinary trends across studies. To enhance reliability and trustworthiness, all screening and eligibility assessments were independently conducted by two reviewers, with disagreements resolved through discussion and consensus.

Despite its rigor, the review has several limitations. Restricting the search to English-language publications may have excluded relevant Indonesian-language studies and local reports. Additionally, the emphasis on peer-reviewed literature may have limited the inclusion of community-based documentation and other grey literature relevant to indigenous preservation practices. Nevertheless, the systematic procedures employed ensured a transparent and analytically robust synthesis of current scholarship on Nias cultural heritage preservation

RESULTS

Analysis of the 60 included studies demonstrates a substantial increase in scholarly attention to Nias cultural heritage preservation between 2018 and 2026. Publication output remained limited during the early review period, with only two studies in 2018 and one in 2021, but increased steadily after 2022. Research production accelerated sharply from 2023 onward, reaching 7 studies in 2023, 10 in 2024, and a projected peak of 22 publications in 2025, followed by 9 early publications for 2026. This pattern indicates a transition from an emergent research field toward a more consolidated and interdisciplinary domain characterized by expanding methodological and thematic diversity.

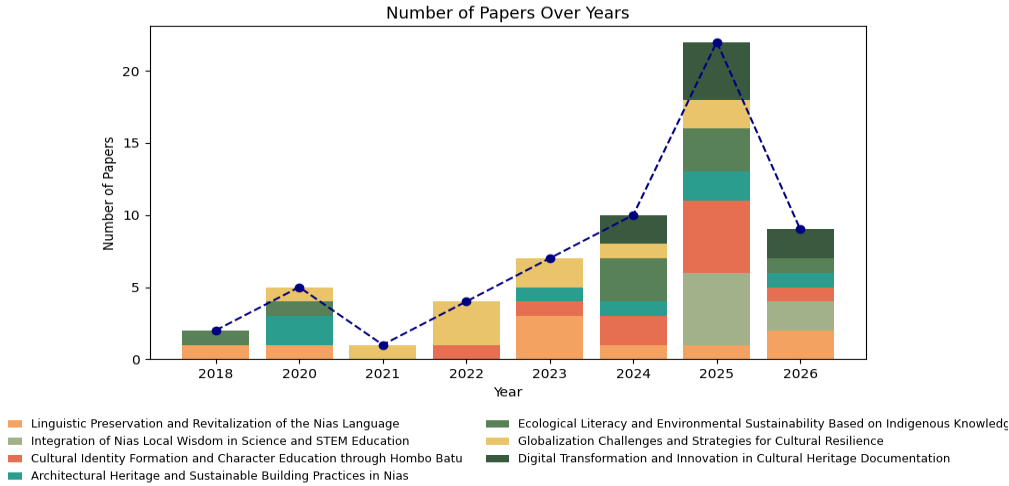


Figure 2. Research trends in the domain of Nias language preservation, cultural identity, and sustainability of local heritage.

The growth trajectory appears closely associated with increasing global concern regarding indigenous language endangerment, the expansion of Indonesian policies supporting local-language education, and wider access to digital preservation technologies. Thematic distribution across the identified clusters further revealed uneven scholarly concentration. Research related to “Cultural Identity and Character Education through Hombo Batu” and “Integration of Local Wisdom into STEM Education” experienced the most rapid growth after 2024, indicating a strong pedagogical turn in recent scholarship. In contrast, linguistic revitalization studies demonstrated more stable but less accelerated development, suggesting that language preservation

remains foundational but no longer dominant. Research concerning digital heritage documentation also expanded substantially after 2024, reflecting increasing interest in technology-assisted preservation.

Table 1. Integrated Summary of Research Clusters on Nias Language Preservation, Cultural Identity, and Heritage Sustainability.

No.	Thematic Cluster	Major Focus	Key Findings
1	Linguistic Preservation and Revitalization	Language education, revitalization, language shift, and ecolinguistics	Formal education and community-based revitalization programs were identified as essential mechanisms for sustaining the Nias language. Language shift was strongly associated with migration, urbanization, and the dominance of Bahasa Indonesia and English. Ecolinguistic studies further demonstrated that village names, greetings, and lexical systems preserve ecological knowledge and cultural values.
2	Integration of Local Wisdom in STEM Education	Ethnoscience, ecological literacy, and contextual STEM learning	Local traditions such as <i>Hombo Batu</i> enhanced science literacy and contextual understanding of physics, biology, and mathematics. Ethnoconstructivist approaches increased learner engagement, cultural relevance, and contextualized scientific understanding.
3	Cultural Identity and Character Education	Globalization, identity formation, and local wisdom pedagogy	<i>Hombo Batu</i> functioned simultaneously as a cultural symbol, pedagogical medium, and resilience mechanism. The studies emphasized kinship, solidarity, discipline, courage, and social cohesion as core values transmitted through local traditions.
4	Architectural Heritage and Sustainable Building	<i>Omo hada</i> preservation, seismic resilience, and sustainable architecture	Traditional houses reflected indigenous ecological adaptation, seismic resilience, and cultural symbolism. Major preservation challenges included structural deterioration, inadequate maintenance expertise, and limited conservation planning.
5	Ecological Literacy and Indigenous Sustainability	Climate adaptation, medicinal plants, and traditional environmental knowledge	Indigenous ecological practices contributed to environmental conservation, disaster mitigation, and sustainable livelihoods. Rituals, naming systems, and ethnobotanical knowledge reinforced eco-cultural identity and environmental awareness.
6	Globalization and Cultural Resilience	Cultural erosion, tourism commodification, and decolonization	Globalization simultaneously threatened and promoted local culture. Community agency, symbolic resistance, indigenization, and adaptive cultural strategies emerged as important mechanisms for sustaining cultural resilience.
7	Digital Transformation and Heritage Documentation	Digital storytelling, e-learning, and AI-assisted preservation	Digital technologies expanded opportunities for cultural documentation, education, and identity reinforcement. However, concerns regarding sustainability, indigenous data sovereignty, and community control remained significant challenges.

Source: Synthesized by the authors from the reviewed literature (2018–2026).

The linguistic preservation cluster emphasized the strategic importance of educational integration and intergenerational transmission. Studies consistently reported that embedding the Nias language into formal

curricula strengthened cultural continuity and countered language marginalization. However, language vitality remained threatened by migration, urbanization, and shifting socioeconomic aspirations. Comparative studies on minority language decline demonstrated similar patterns across global indigenous contexts, reinforcing concerns regarding long-term linguistic sustainability. Ecolinguistic research further revealed that Nias linguistic systems encode ecological knowledge, social values, and cosmological meanings, indicating that language loss would simultaneously diminish cultural and environmental knowledge systems.

Research on STEM and science education demonstrated increasing incorporation of indigenous knowledge into contextual learning frameworks. Studies employing ethnoscience and ecological literacy approaches found that integrating local wisdom into science instruction improved conceptual understanding and learner engagement. Hombo Batu was repeatedly identified as an effective pedagogical medium for teaching physics, mathematics, and biology through culturally familiar examples. Several studies also demonstrated that ethnoconstructivist and culturally responsive learning models strengthened students' independence, critical thinking, and cultural identity.

The Hombo Batu tradition emerged as a central mechanism of cultural identity formation and character education. Findings indicated that the tradition functions not only as ritual performance but also as a symbolic system transmitting values of courage, discipline, solidarity, and social responsibility. Globalization studies revealed that Hombo Batu has undergone adaptive transformation through tourism, education, and media representation while retaining symbolic importance within Nias identity construction. However, scholars also highlighted tensions between cultural preservation and commodification, particularly in tourism-oriented representations.

Architectural heritage studies demonstrated that traditional omo hada houses embody sophisticated indigenous engineering principles, including seismic resilience, natural ventilation, and sustainable material use. Semiotic analyses further showed that architectural structures encode cosmological and social hierarchies central to Nias worldview. Despite their significance, many structures face deterioration because of inadequate maintenance systems, limited technical expertise, and insufficient conservation funding.

Research on ecological literacy emphasized the role of indigenous knowledge in environmental sustainability and climate adaptation. Traditional rituals, naming practices, medicinal plant knowledge, and local environmental management systems were identified as mechanisms supporting ecological awareness and sustainable livelihoods. Several studies argued that integrating indigenous ecological knowledge into education and environmental governance could strengthen climate resilience and community empowerment.

Studies addressing globalization and digital transformation collectively suggested that cultural resilience depends increasingly on adaptive and participatory preservation strategies. Digital storytelling, animation, e-learning platforms, and AI-assisted cultural design were identified as promising tools for heritage transmission and identity reinforcement. Nevertheless, the literature emphasized the importance of indigenous data sovereignty, community participation, and ethical governance to prevent cultural commodification and external appropriation. Overall, the findings indicate that sustainable preservation of Nias heritage requires an interdisciplinary framework integrating language revitalization, education, architecture, ecological knowledge, digital innovation, and community-based governance.

DISCUSSION

The findings reveal that the preservation of Nias cultural heritage constitutes an interconnected cultural ecosystem in which language vitality, cultural identity, education, ecological knowledge, architecture, digital innovation, and community resilience function as mutually reinforcing dimensions rather than isolated domains. Across the reviewed studies, effective preservation initiatives consistently adopted holistic and interdisciplinary approaches, indicating that fragmented interventions are insufficient for sustaining indigenous heritage in the context of globalization.

A major cross-cutting finding concerns the dual role of formal education as both a driver of language shift and a strategic mechanism for revitalization. Studies on linguistic preservation [12]; [15] demonstrated that the dominance of Bahasa Indonesia in formal schooling contributes to declining intergenerational

language transmission. However, the same educational institutions can become powerful sites of revitalization when local languages and indigenous knowledge are integrated into curricula. Research on Hombo Batu and STEM education further showed that culturally responsive and ethnoscience-based pedagogies improve not only cultural awareness but also science literacy and learner engagement. These findings support broader theoretical arguments that indigenous knowledge systems should be recognized as legitimate epistemological frameworks rather than supplementary cultural content.

Another central issue involves the tension between authenticity and adaptation. Studies on Hombo Batu, traditional architecture, and digital innovation showed that cultural practices increasingly transform tourism, technology, and contemporary reinterpretation [16]; [17]. Rather than viewing adaptation as cultural decline, several studies suggest that heritage sustainability depends on the ability of traditions to evolve while preserving their underlying symbolic meanings and social values. This perspective aligns with dynamic theories of cultural resilience, which conceptualize heritage as adaptive rather than static.

Community agency also emerged as a decisive factor in sustainable preservation. Research on cultural resilience and indigenous data sovereignty [18]; [19] emphasized that communities are more successful in maintaining heritage when they retain authority over cultural representation, digital documentation, and adaptation processes. These findings challenge top-down preservation models and instead support participatory, community-led approaches grounded in indigenous governance principles.

The review contributes theoretically by supporting an ecological model of cultural heritage in which language, identity, material culture, ecological practices, and social institutions operate as interdependent systems. Cultural identity functions as both an outcome and a driver of heritage sustainability, reinforcing participation in language maintenance and traditional practices. This reciprocal relationship highlights the importance of identity-centered preservation strategies.

Practically, the findings underscore the need for integrated educational reform, bilingual curricula, community-based heritage management, and culturally responsive digital preservation initiatives. Policymakers should prioritize collaborative frameworks involving educators, cultural practitioners, elders, and local communities to ensure preservation efforts remain contextually relevant and socially sustainable.

Several limitations should be acknowledged. The review was restricted to English-language publications and peer-reviewed sources, potentially excluding Indonesian-language studies and community-based documentation. In addition, thematic categorization involved interpretive judgment, and no formal quality appraisal tool was employed. Future research should therefore incorporate multilingual sources, participatory methodologies, and empirical evaluations of preservation interventions. Longitudinal and comparative studies examining the relationships between language vitality, cultural identity, educational outcomes, and digital engagement are particularly needed to strengthen evidence-based preservation strategies.

CONCLUSION

This systematic literature review addressed the interconnections between Nias language preservation, cultural identity maintenance, and local heritage sustainability, synthesizing findings from 60 studies published between 2018 and 2026. We confirm that successful preservation efforts require holistic, interdisciplinary approaches that simultaneously address linguistic revitalization, educational integration, architectural conservation, and ecological knowledge transmission. The reviewed studies collectively demonstrate that cultural identity serves as a mediating mechanism that both motivates and is strengthened by heritage sustainability practices, creating potential reinforcing cycles when interventions are well-designed. Community agency and control over representation emerged as critical enabling factors for sustainable preservation.

The theoretical contribution of this review lies in its articulation of an ecological model of cultural heritage, wherein language, practices, knowledge systems, and material culture function as interdependent components of a dynamic system. This framework challenges fragmented preservation approaches and provides a conceptual foundation for integrated intervention design. Practically, our findings inform policy by identifying educational reform as a leverage point with demonstrated potential to simultaneously address

multiple heritage dimensions. The synthesis also highlights the necessity of supporting community-led digital documentation initiatives while respecting indigenous data sovereignty, and of coordinating heritage management across linguistic, educational, architectural, and environmental sectors.

Future research should prioritize empirical evaluations of specific preservation interventions using longitudinal and quasi-experimental designs, investigate the understudied role of Nias diaspora communities in heritage maintenance, and examine how social media platforms shape language use and cultural identity among younger generations. Participatory methodologies that center Nias community voices as co-researchers are essential. By establishing this foundational map of existing knowledge, we provide researchers, policymakers, and community leaders with evidence-based guidance for sustaining Nias cultural heritage amid contemporary challenges.

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