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RESEARCH ARTICLE

# Reconstructing Indigenous ecological knowledge through Madurese folklore: Cultural heritage, water conservation, and sustainability

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**ABSTRACT**
The increasing ecological problems and the weakening of local knowledge inheritance emphasize the importance of re-examining folklore as a source of ecological knowledge of the Madurese community. This study aims to reconstruct local ecological knowledge represented in Madurese folklore through the practice of spring management, water utilization mandate, water source zoning, and landscape governance. The study uses a qualitative approach with a literature study research type. Data in the form of ecological narratives obtained from a collection of Madurese folklore were analyzed using reading and note-taking techniques . Data analysis through data reduction, data presentation, and drawing conclusions and strengthened through triangulation of sources and theories. The results of the study indicate that the community is represented as having ecological knowledge in maintaining the environment around the spring as a buffer for the sustainability of water sources. The story of the Origin of Pancoran from Tambakagung Village shows the existence of an ecological mandate and the principle of fair use of water sources for local communities and migrants. The story of the Origin of Kramiyan Village represents the management and zoning of water sources based on the functions of bathing, treatment, and consumption. Meanwhile, the Folktale of Mount Geger and the Origin of the Word Madura show landscape-based knowledge through the relationship between forests, rivers, and nipah vegetation in the formation of living spaces. These findings confirm that Madurese folklore is a source of local ecological knowledge that contributes to thinking about water conservation and sustainability, while also offering novelty by reconstructing folklore as a medium for transmitting ecological knowledge between generations.

**Keywords:**Local Ecological Knowledge; Madurese Folklore; Water Conservation; Sustainability.

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## INTRODUCTION

Current global environmental problems are characterized by increasing damage to ecosystems, water pollution and scarcity, deforestation, climate change, and declining biodiversity which threaten the sustainability of human life (Bănăduc et al., 2022; Hoque & Sultana, 2024; Firnanda et al., 2025). Population growth, exploitation of natural resources, urbanization, and unsustainable consumption patterns are increasing pressure on the environment (Arslan et al., 2022). Amidst these conditions, the ecological knowledge of local communities that has developed through experience, tradition, and cultural practices is potentially neglected due to modernization and social change (Dalyan et al., 2024; Yulianingsih et al., 2025; Nugraha et al., 2026). In fact, this knowledge can include principles of conservation, natural resource management, and harmonious relationships between humans and the environment that are relevant to supporting the global sustainability agenda.

Madura faces increasingly complex ecological problems, particularly those related to water availability and the sustainability of natural resources (Naqi'ah et al., 2026). Madura's geographical characteristics tend to be dry, with a long dry season, and uneven distribution of rainfall, causing some areas to experience water shortages, especially during the dry season (Elys Fauziyah, 2026; Setiawan & Astid, 2025). This issue not only impacts the fulfillment of community needs but also relates to the sustainability of ecosystems and community life activities that depend on natural resources. Environmental change and modernization have the potential to shift the ecological knowledge of communities that has been passed down from generation to generation. This knowledge is reflected in various cultural practices and folklore that describe how communities understand, utilize, and maintain their relationship with nature.

Island needs an environmental conservation approach that is not only based on modern solutions, but is also rooted in knowledge that has lived within the community (Efendi, 2026; Romadhon, 2026). One effort that can be made is to revitalize local ecological knowledge through the exploration and reuse of Madurese cultural heritage, especially that documented in folklore. Folklore is not only seen as a work of literature or entertainment, but as a medium for passing on knowledge about how to maintain springs, regulate water use, protect the environment, and build harmonious relations between humans and nature. The reconstruction of this knowledge can be integrated into environmental education, community-based conservation programs, and natural resource management policies so that local wisdom does not remain a legacy of the past, but can be

contextualized as an ecological strategy that is relevant to Madura's environmental sustainability.

Behind the stories passed down from generation to generation, Madurese folklore holds ecological knowledge that has the potential to answer today's environmental challenges (Baruadi & Eraku, 2026). This research is important to study because Madurese folklore has not been widely positioned as a source of ecological knowledge that can contribute to solving contemporary environmental problems. Narratives about springs, forests, rivers, and procedures for utilizing natural resources show that Madurese people have an ecological understanding that is built through experience and passed down between generations. This knowledge is at risk of being marginalized by modernization if it is only treated as part of the literary heritage without examining its relevance to sustainability. The researchers are of the view that environmental conservation is not enough to rely solely on technocratic approaches and formal policies, but also needs to acknowledge and contextualize ecological knowledge born from the experiences of local communities. Therefore, reconstructing ecological knowledge in Madurese folklore is important to uncover hidden conservation values while positioning it as cultural knowledge that can contribute to ecological education, water conservation, and sustainable development.

This research uses the concept of Indigenous Ecological Knowledge (IEK) developed by Berkes (2012) used the concept as the primary basis for identifying the knowledge, practices, and values of Madurese society in interacting with the environment, which are passed down from generation to generation. This concept is used to examine community knowledge regarding spring maintenance, water management, environmental protection, and the sustainable use of natural resources. According to the theory Ecocriticism from Glotfelty & Fromm (1996) used this to analyze the representation of the relationship between humans and the environment in Madurese folklore. The combination of these two perspectives views folklore not only as a cultural product but also as a medium for transmitting local ecological knowledge relevant to water conservation and environmental sustainability.

Sejati et al., (2026) in their findings showed that Petik Laut represents a harmonious relationship between humans and nature through respect for the sea as a living entity. Ecological practices such as the use of onjem , the prohibition of fishing on Fridays, the protection of coastal sites, and the raising of wild goats reflect local knowledge in maintaining ecosystem sustainability. These practices confirm that Madurese indigenous

knowledge is relevant in marine and coastal conservation while reinforcing the importance of preserving cultural and ecological heritage.

Efendi et al. (2024) in their research showed that the water source in the story represents both sanctity and ecological balance. Various prohibitions on the use of trees, animals, and natural resources around the spring reflect community practices in maintaining the sustainability of the ecosystem. Furthermore, annual rituals in the water source area strengthen the spiritual dimension in the relationship between humans and nature, while making folklore a medium for passing on local wisdom and environmental conservation practices.

Firnanda et al. (2025) also researched Madurese folklore that represents environmental conservation messages through reforestation practices as an effort to maintain ecosystem balance. The environmental literary perspective is reflected through the depiction of human relationships with nature, manifested in reforestation, protection of flora and fauna, and efforts to maintain the sustainability of water resources. These ecological values are related to the Sustainable Development Goals (SDGs) agenda, particularly SDG 3, SDG 6, SDG 8, SDG 13, and SDG 15.

Three previous studies have demonstrated that Madurese culture and folklore contain ecological practices, ranging from marine and spring conservation to reforestation and biodiversity protection. However, these studies tend to be descriptive and sectoral, emphasizing the identification of ecological practices or values without examining how this knowledge is formed, inherited, and functions as a local knowledge system. This limitation highlights a significant research gap: the need to reconstruct Indigenous Ecological Knowledge in Madurese folklore as intergenerational ecological knowledge that can be contextualized for water conservation and environmental sustainability.

The novelty of this research lies in the effort to reconstruct the ecological knowledge of the Madurese people contained in folklore as a knowledge system passed down between generations, not merely identifying the environmental values within it. This research combines studies on water conservation, ecosystem protection, natural resource utilization, and human relations with the environment within a sustainability framework. Folklore is positioned not only as a cultural heritage, but also as a source of local ecological knowledge that can be developed to support environmental education, community-based conservation, and sustainable environmental preservation. The purpose of this research is to reconstruct the local ecological knowledge of the Madurese people represented in folklore through the practice of spring management, trust and fairness in water use, water

source zoning, and resource and landscape governance as the basis for environmental sustainability. The benefits of this research are to enrich literary studies and local ecological knowledge by revealing Madurese folk tales as a source of cultural knowledge that can support water conservation, natural resource management, and environmental sustainability. The benefits of this research are to enrich literary studies and local ecological knowledge by revealing Madurese folk tales as a source of cultural knowledge that can support water conservation, natural resource management, and environmental sustainability.

## METHOD

This study uses a qualitative approach with a literature study (Syahrizal & Jailani, 2023). The research data are in the form of narratives that represent ecological knowledge, conservation practices, natural resource utilization, and human relationships with the environment. The main data source is a collection of Madurese folktales containing narratives about springs, water, forests, plants, animals, and the natural environment. Although the collection of Madurese folktales contains more than 10 stories related to the natural environment, the researcher has specifically selected and analyzed 4 folktales deemed to have the strongest ecological representation. The selection of Madurese folktales is based on the consideration that these stories are part of the cultural heritage that contains knowledge, values, and practices of society in interacting with the environment that are passed down from generation to generation (Azhar, 2016).

Data collection techniques were carried out through reading and note-taking (Fatimah et al., 2026). Researchers read data sources repeatedly to identify parts of the story related to ecological knowledge, then recorded, grouped, and coded the data based on the research focus. Data analysis was carried out interactively through the stages of data reduction, data presentation, and drawing conclusions (Miles et al., 2018). In the reduction stage, relevant data were selected and categorized based on the forms of ecological knowledge, such as water conservation, environmental protection, natural resource utilization, and human-nature relationships. The categorized data were then presented systematically to identify patterns, meanings, and interrelationships between findings before conclusions were drawn regarding the forms and functions of ecological knowledge in Madurese folklore.

Data validity was tested through source triangulation and theory triangulation (Rozaq & Anam, 2026). Source triangulation was conducted by comparing ecological

information found in several Madurese folktales to see the consistency of the patterns of environmental knowledge and practices represented. Meanwhile, theory triangulation was conducted by interpreting the data using the concept of Local Ecological Knowledge and an ecocritical perspective, so that the interpretation results were not only based on subjective readings of the text. This process was carried out carefully and iteratively to ensure that the research findings had a strong textual basis and were able to demonstrate the relationship between cultural heritage, ecological knowledge, environmental conservation, andsustainability.

## RESULTS AND DISCUSSION

Behind the diverse narratives of Madurese folklore lies a pattern of ecological knowledge that captures how communities understand and manage their environment. The following table presents a synthesis of the analysis of four Madurese folktales based on ecological narratives, forms of local knowledge, and key findings. This presentation demonstrates that Madurese folktales not only represent the relationship between humans and nature but also encompass knowledge about ecosystem-based conservation, ecological mandates, water resource management, and an understanding of landscape characteristics as a basis for sustainability.

| No | Madurese Folk Tales | Ecological Data | Key Findings |
|---|---|---|---|
| 1 | The Origins of Banyuajuh Hamlet and Beruk Village | The king then continued by asking whether there was a person or group of people guarding the spring to ensure its freshness. The residents said there was no guard. They simply protected the surrounding environment from damage. By protecting the surrounding environment, they believed, the spring would remain pure and beautiful. | The preservation of springs is understood to depend on the protection of the surrounding environment, so conservation is carried out collectively without special guards. |
| 2 | The Origin of Pancoran from Tambakagung Village | The Origin of the Fountain from Tambakagung Village In his sleep, he dreamed of being visited by a very beautiful woman wearing a white robe. The woman told Suli that he should do his best to care for the spring. She entrusted the spring to Suli. The woman also told Suli that the water from Pancoran could benefit not only the people around Tambak Agung, but also new arrivals. | Water resources are seen as a trust that must be protected so that its benefits can be enjoyed widely, demonstrating moral and social responsibility towards natural resources. |
| 3 | The Origin of Kramiyan Village | One day, Abdul Qohir divided the spring into two parts. The first, in the north, was specifically for women. The second, in the south, was specifically for men. Abdul Qohir divided the southern part into three parts. The first, in the north, was a place where the water was | The division of space and function indicates the existence of local mechanisms to regulate water use while reducing uncontrolled use. |

| | | | |
|---|---|---|---|
| | | specifically used for bathing, the second, in the middle, was a place where the water was said to have medicinal properties, and the third (southernmost) was specifically for drinking water. | |
| 4 | The Folktale of Mount Geger and the Origin of the Word Madura | Raden Segoro's entourage marched north through hills and trees. In a dense forest, bisected by a river lined with nipah palms, or what we now know as the Nepa Forest, Raden Segoro and his entourage stopped. Raden Segoro and Bendoro Gung felt the place was safe enough from the pursuit of the Medang Kamulan kingdom's troops. There they then built a settlement. | The selection of living space shows the ability to recognize the ecological character of an area through the relationship between forests, rivers and vegetation. |

**Table 1.** Synthesis of Narrative Analysis and Ecological Knowledge in Madurese Folklore

## Local Ecological Know ledge in Water Spring Management in Madurese Folklore The Origin of Banyuajuh Hamlet and Beruk Village

Ecological knowledge in Madurese folklore is reflected in the way the community maintains and utilizes natural resources sustainably (Zain & Astina, 2025). One form of this practice is spring maintenance, which involves protecting the surrounding environment. This practice demonstrates an understanding that environmental sustainability is closely linked to the sustainability of water sources. This can be seen in the following quote:

> Data (1): " The king then continued his question whether there was a person or group of people who guarded the spring so that its freshness was always maintained. The residents said that the spring had no guard. They only guarded the natural environment around the spring so that it would not be damaged. By protecting the natural environment, they believed, the spring would remain pure and good." (The Origin of Banyuajuh Hamlet and Beruk Village, Page 157).

This quote illustrates the community's understanding of the importance of protecting the environment as part of efforts to maintain the existence of springs. The absence of a specific person or group specifically tasked with protecting the springs indicates that this responsibility is understood as a shared obligation. The community focuses not only on the condition of the water but also on the surrounding environment. This perspective demonstrates an awareness that the condition of water sources is closely related to the natural conditions that support them (Mulyanti, 2022; Lakilaki, 2026). If the environment around the springs is maintained, the community believes that water quality will also remain good. This view aligns with the concept of Local Ecological Knowledge proposed by Berkes (2012) which states that community knowledge about the environment is formed from ongoing experiences and interactions. The act of protecting the environment around

springs can be understood as ecological knowledge that is not only practical but also part of the habits and values inherited in community life.

Glotfelty & Fromm's (1996) ecocritical perspective, the story demonstrates that nature plays a vital role in people's lives. The spring is not merely a setting in the story but also an integral part of the environment that must be maintained to ensure its continued benefit. The community's belief that environmental damage can affect the condition of the spring demonstrates the interdependent relationship between humans and their environment. This relationship demonstrates that the use of nature is inseparable from the obligation to care for it. The community is not positioned as having complete power over nature, but rather as part of the environment that shares responsibility for its sustainability. This representation demonstrates the ecological value inherent in folklore, particularly regarding the importance of balance between human needs and the existence of natural resources. The story ultimately presents the perspective that preserving nature is part of maintaining the sustainability of the community itself.

Spring maintenance actually occurs through a shared awareness to protect the environment from damage. This situation demonstrates that conservation practices can grow from knowledge and values that have developed within the community. Berkes (2012) argues that local ecological knowledge does not stand alone, but is intertwined with environmental management practices and the values that guide people's behavior towards nature. Folklore then becomes one means by which this knowledge continues to be known and passed on to the next generation (Malapane et al., 2024; Wiysahnyuy & Valentine, 2023). Local wisdom cannot be immediately considered the sole answer to current environmental problems because changing ecological conditions require adjustments to current knowledge and needs. A more appropriate position is to position this knowledge as a learning resource that can be integrated with a scientific approach in conservation efforts. This shows that Madurese folklore has a broader function than simply preserving stories of the past, as it contains knowledge about the relationship between humans, water sources, and the environment that is still relevant for study in the context of sustainability. The author's findings in this story reveal a conservation pattern that doesn't directly focus on the spring, but rather on protecting the environment that supports it. The community doesn't form a special group to monitor the water source, but rather maintains the natural environment around the spring to ensure it remains in good condition (Jung et al., 2023).

This pattern demonstrates that the sustainability of water sources is understood as a consequence of maintaining the entire environment. This knowledge demonstrates a systemic ecological mindset, as the community sees the interconnectedness between soil, plants, the surrounding environment, and the presence of water. This finding is not simply understood as a form of wisdom in preserving springs, but also demonstrates the existence of a conservation mechanism based on collective awareness without relying on formal institutional structures. The community's belief that preserving nature will maintain the purity of the springs demonstrates the existence of ecological cause-and-effect knowledge formed from the experience of living with the environment (Imamah & Pebriyani, 2023). This story reveals an ecosystem-based conservation model that is conceptually relevant to sustainable water resource management, yet rooted in local community knowledge and practices.

**Ecological Mandate and Fair Use of Water Resources in Madurese Folklore The Origin of the Fountain from Tambakagung Village**

Water sources in Madurese folklore are not only depicted as part of the environment, but also as a natural heritage that has value and benefits for communal life (Efendi et al., 2025). The existence of springs encourages the emergence of responsibility to care for and maintain their quality so that they can continue to be used by the community (Batoro et al., 2022). The mandate to protect these sources demonstrates an awareness that the use of natural resources must be accompanied by conservation efforts. This value reflects the local community's view that nature is a vital part of the continuity of life and its benefits must be maintained for various groups. The following story, "The Origins of Pancoran" from Tambakagung Village , illustrates this responsibility to protect water sources.

> Data (2): "The Origin of the Fountain from Tambakagung Village In his sleep, he dreamed of being visited by a very beautiful woman wearing a white robe. The woman told Suli that he should do his best to care for the spring. She entrusted the spring to Suli. The woman also told Suli that the water from Pancoran could benefit not only the people around Tambak Agung, but also newcomers. (The origin of Pancoran from Tambakagung Village, Page 125).

The quote shows that the water source in the story of the Origin of Pancoran from Tambakagung Village is constructed as an ecological resource that has a social function for the community's life. The mandate to care for the water source shows that the use of natural resources is inseparable from the responsibility to maintain its sustainability. This finding can be explained through the concept of Local Ecological Knowledge Berkes (2012)

which views ecological knowledge as an integration of knowledge, practices, and values that develop through the interaction of society with the environment. The message to protect water sources represents normative knowledge that directs human behavior so that it is not only oriented towards utilization, but also towards maintaining resources (Kherazi et al., 2024; Revi et al., 2026). The statement that Pancoran water benefits both the Tambak Agung community and newcomers demonstrates the principle of shared benefit in resource management. Thus, water resources are not positioned as commodities intended only for certain groups, but as resources with broader social and ecological value. This pattern indicates that the ecological knowledge represented in the story encompasses both ecological and social dimensions in maintaining the sustainability of water resources.

Through the ecocritical perspective of Glotfelty & Fromm (1996) the representation of water sources in the story demonstrates the interdependent relationship between humans and the environment. Water not only functions as a supporting element in the story's structure, but also becomes the center of life that determines the usefulness of space for society. The presence of a female character who conveys a message to care for water sources can be read as a symbolic construction that provides moral legitimacy to humans' obligation to preserve nature. This message shows that the relationship between humans and the environment is built through the principle of responsibility, not solely through the interests of utilization. This representation is read as a form of cultural knowledge about how humans should place themselves within ecological networks. The provision of water benefits to local and migrant communities shows that the existence of natural resources is constructed within a framework of shared interests (Zhang et al., 2023; Ali & Kamraju, 2024). The story presents an ecological discourse that connects the maintenance of water sources with social values such as care, openness, and cross-group benefits.

The mandate of preservation is given to Suli as an individual so that the benefits of the water source are projected to the wider community, including those from outside the Tambak Agung area. This shows that local ecological knowledge in the story does not merely talk about techniques for maintaining water sources, but also contains social principles regarding the inclusive distribution of resource benefits. Berkes (2012) suggests that the relationship between values, practices, and environmental utilization shows that natural resource management is part of a community knowledge system formed through experience and cultural norms. Folklore functions as a medium that maintains this

knowledge system through narratives, symbols, and moral messages that can be passed down between generations (Tista & Saputra, 2025). The meaning of water conservation goes beyond simply protecting the physical condition of water sources to maintaining social values that regulate their benefits for various parties. Therefore, the story of the Origin of Pancoran from Tambakagung Village can be understood as a representation of local ecological knowledge that integrates water source conservation, social responsibility, and sustainable resource utilization in a single cultural knowledge unit.

The findings of this study are based on the emergence of the concept of ecological trust in water resource management. Water is not viewed solely as a human possession, but as a trust that must be safeguarded so that its benefits remain available to the wider community. This trust demonstrates that conservation is built through both moral responsibility and social concern. The benefits of water are also intended for newcomers, thus the story represents the principle of ecological justice in access to resources. Conservation in the story is not only related to maintaining the existence of water, but also ensuring its equitable and sustainable use.

**Ecological Governance and Zoning of Water Sources in the Local Knowledge of the Madurese Community in the Folktale of the Origin of Kramiyan Village**

The management of water resources in the story demonstrates the existence of local governance that regulates the use of springs based on their function and the community's needs . The distribution of water sources for bathing, treatment, and consumption reflects the existence of rules that control the regular use of resources (Varma et al., 2024). This pattern demonstrates that the community possesses ecological knowledge that integrates social needs with natural resource management. Springs are viewed not only as a source of life but also as an ecological space whose use is regulated through cultural values and practices. This depiction is found in the following story, "The Origins of Kramiyan Village."

> Data (3): "One day, Abdul Qohir divided the spring into two parts. The first part in the north was specifically used for women. The second part in the south was specifically for men. In the southern part, Abdul Qohir divided it back into 3 parts. The first part in the north was a place where the water was specifically used for bathing, the second part in the middle was a part whose water was said to have medicinal properties, while the third part (the southernmost) was a part specifically used for drinking water." (The Origins of Kramiyan Village, page 166).

These data indicate that the community in the story of the Origin of Kramiyan Village has a local mechanism for regulating the use of water sources based on their function and social needs. The division of springs into several sections indicates that their use does not

occur freely, but rather follows predetermined allocations (Sudiartono, 2025; Serang et al., 2026). The spatial differentiation between women and men also shows that water resource management is intertwined with the social structure of society. Based on Berkes' (2012) Local Ecological Knowledge perspective , ecological knowledge encompasses an integration of environmental understanding, management practices, and norms governing human interaction with natural resources. The separation of water functions for bathing, treatment, and consumption can be understood as a form of practical knowledge that develops from community experience in meeting life's needs. This division also forms a utilization boundary that can prevent uncontrolled use of water resources (Makbul et al., 2023). This narrative shows that water management is the result of the interaction between ecological needs, social interests, and cultural knowledge of the community.

Through Glotfelty & Fromm's (1996) ecocriticism , the water source in the narrative serves not merely as a setting but as an integral part of the community's social and ecological life. The spring is constructed as a space with different functions according to human needs, so that the relationship between humans and the environment takes place through a process of regulation and adaptation (Triwahyuni, 2026). The separation of water for bathing, treatment, and consumption demonstrates an awareness of the different functions and values of resources based on their intended use. Placing drinking water in a separate space can be read as a form of caution in maintaining water sources directly related to consumption needs. This representation shows that interaction with nature is not only based on exploitation, but also on efforts to create order in its use. This practice shows that human relations with the environment are shaped by social norms and cultural practices that develop within the community. Therefore, this story represents how society integrates natural resource management into their social life.

The emergence of a water source zoning pattern based on ecological and social functions is not yet sufficiently understood as simply a division of water use areas (Rifandini & Nagari, 2024). This zoning demonstrates a mechanism for controlling resource utilization through the establishment of spatial and functional boundaries, so that hygiene, medical, and consumption needs have different areas of use. This pattern broadens the understanding of local ecological knowledge because conservation is not always realized through prohibitions, but can occur through spatial regulation and differentiation of resource functions. Berkes (2012) stated that this practice demonstrates the connection between ecological knowledge, social rules, and community experience in managing

available resources. Folklore serves as a medium for cultural documentation that maintains knowledge about water resource management and allows this knowledge to be passed down across generations. At the same time, the division based on gender indicates that ecological practices are inseparable from the social structure and cultural values that prevail in society at a certain time. The origins of Kramiyan Village can be understood as a representation of ecological knowledge that combines spatial zoning, differentiation of water functions, social regulation, and the need for resource sustainability within a single culture-based management system.

The critical findings of this study demonstrate a hierarchy of water source functions oriented toward protecting consumption needs. The separation of water for bathing, treatment, and drinking indicates the regulation of its use based on the level of importance and risk of use. Placing drinking water in a dedicated space can be interpreted as a form of caution to protect sources directly related to health. This pattern demonstrates that local ecological knowledge not only regulates resource sustainability but also integrates conservation, health, and water spatial governance.

## Reconstruction of Local Ecological Knowledge in the Governance of Madura's Resources and Landscape in the Folktale of Mount Geger and the Origin of the Word Madur

The relationship between humans and the environment in Madurese folk tales can be traced through the way characters recognize and utilize the characteristics of the natural space around them (Rahman, 2022). Forests, rivers, and nipah palms are depicted as environmental elements that have important functions in supporting human life. The existence of these various elements shows that nature is understood as a space that provides protection and supports the formation of settlements. The selection of forest areas as settlements also shows consideration of environmental conditions in determining living spaces. This representation shows that knowledge about the environment has become part of the experiences and practices of the community, passed down through stories. A description of the relationship between humans and the environment is found in the following excerpt from Morteka from Madhura: Folktales of Mount Geger and the Origins of the Word Madura.

> Data (4): "Raden Segoro's group walked north through hills and trees. In a dense forest, in the middle of which was divided by a river that was overgrown with Nipah trees, or a place that we now know as the Nepa Forest, Raden Segoro and his group stopped. Raden Segoro and Bendoro Gung felt that the

> place was safe enough from the pursuit of the Medang Kamulan kingdom's troops. In that place they then built a settlement." (Folklore of Mount Geger and the Origin of the Word Madur a Page 12).

The quote shows that human relations with the environment are built through a process of recognizing the ecological character of an area. Forests, rivers, hills, and nipah vegetation are not merely present as background elements, but play a role in shaping the suitability of space for human life (Oriel, 2024). The decision of Raden Segoro and his entourage to stop and build a settlement indicates a process of adaptation to the available environmental conditions. According to Berkes (2012) Local Ecological Knowledge the ongoing interaction between humans and the environment produces knowledge about the character, function, and potential of an ecosystem. The presence of rivers and nipah vegetation in the narrative can be understood as ecological markers indicating the availability of water and life-supporting resources. The selection of settlement locations represents a form of ecological knowledge that works through the ability to read landscape conditions before determining living space (Eraku & Baruadi, 2025; Hariyanti et al., 2025). The narrative indicates that the community's sustainability from the beginning was linked to its ability to adapt to the characteristics of the local environment.

Glotfelty & Fromm (1996) argue that the depiction of forests, rivers, and vegetation in the story demonstrates that nature has a substantive function in shaping narrative meaning. The environment is not positioned as a passive backdrop, but rather a contributing factor to the formation of social space and the sustainability of human life (Shi & Tian, 2025; Al-Azzawi et al., 2025). The river that divides the forest area and the presence of nipah vegetation demonstrate the interconnectedness of various elements within an ecological landscape. This representation demonstrates that human living space is formed through interaction with natural conditions, not solely through social construction. An ecocritical perspective allows these natural elements to be read as part of an ongoing reciprocal relationship between humans and the environment. Settlements not only mark human control of an area but also demonstrate the process of adaptation to the ecological character of the area. Therefore, the story presents a representation of the interdependent relationship between humans and nature, with the environment playing a role in determining the direction of the formation of living space.

The presence of landscape-based ecological knowledge that has not been explicitly reflected in previous water conservation narratives. The selection of forest areas with specific rivers and vegetation demonstrates that ecological knowledge can operate through the ability to recognize the characteristics of a landscape and determine suitable spaces for

habitation. This broadens the concept of local ecological knowledge from merely resource protection practices to adaptive capacities in understanding environmental conditions (Sousa et al., 2022). Berkes states that this process reflects the interconnectedness between environmental knowledge, adaptive experiences, and social decisions in building community life. Folklore plays a role in maintaining this knowledge through narratives of origin that link a region's identity to its ecological character. The Nepa Forest not only serves a geographical function in the narrative but also serves as an ecological space that shapes community memory and identity (Ledyawati & Evita, 2025). This finding confirms that Madurese folklore can be understood as an archive of ecological knowledge that records human adaptation strategies to the landscape, ecosystem interconnectedness, and the formation of living spaces based on environmental conditions.

The findings of this study are as The function of nipah vegetation as an indicator of an area's ecological suitability . The presence of nipah along rivers indicates that communities recognize the relationship between vegetation type, water conditions, and habitat characteristics. These stories not only document the selection of settlement locations but also provide knowledge about biological indicators for interpreting the quality and character of a landscape.

## CONCLUSION

This study shows that Madurese folklore not only serves as a cultural heritage but also represents local ecological knowledge that regulates the community's relationship with natural resources. Madurese folklore often tells about water sources that need to be managed, protected, and even sought for sustainable use. This knowledge includes protecting the environment around springs, trust and justice in water resource utilization, the division of functions and zoning of springs, and the ability to interpret landscape characteristics through the interrelationships of forests, rivers, and vegetation. These findings confirm that ecological knowledge in folklore works through a combination of management practices, social norms, moral values, and the community's adaptive experiences with the environment. This study expands the meaning of local ecological knowledge by demonstrating that folklore can be a medium for transmitting knowledge about conservation, resource management, and adaptation to the landscape. These findings can form the basis for developing environmental education and conservation based on local culture to increase public awareness about the sustainability of water resources. The

reconstruction of the local ecological knowledge of the Madurese people, as reflected in their folklore, aligns directly with the research objective of integrating cultural heritage with water conservation practices and environmental sustainability.

Madurese folklore as a source of ecological knowledge not only contains conservation values but also demonstrates the mechanisms governing access, responsibility, and resource utilization. This research is limited to textual analysis in library sources and therefore does not examine the understanding and practice of this ecological knowledge among contemporary Madurese. Future research could expand the study through fieldwork to compare the ecological knowledge contained in folklore with ongoing environmental management practices in the community.

## DECLARATIONS

### *Ethical considerations*

Not applicable

### *Use of artificial intelligence (AI)*

The author states that the generative artificial intelligence (AI) tool [deepseek translate] was used exclusively for the process of translating into English.

### *Conflict of Interest*

The authors declare no conflicts of interest.

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