



Local Wisdom for Global Challenges: Memayu Hayuning Bawono as a Model for Sustainable Environmental Practices

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ABSTRACT

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The escalating global environmental crises demand an urgent reevaluation and the adoption of sustainable and ecological management practices. Amidst this, the indigenous knowledge encapsulated in local wisdom, such as the Javanese "Memayu Hayuning Bawono" (MHB), offers a unique lens through which communities perceive and interact with their environment. Although MHB has been practiced for generations, a comprehensive understanding of its real-world application and efficacy in contemporary environmental management remains starkly underexplored, presenting a critical research gap. This study embarks on a two-fold objective: 1) to explore the depth and manifestation of MHB within Javanese communities, focusing on its role, significance, and application in environmental stewardship; and 2) to critically evaluate the practicality, challenges, and impact of implementing MHB principles in current environmental management and preservation strategies. Employing a descriptive qualitative methodology, data were meticulously collected through in-depth interviews and observations, involving local leaders and environmental activists from selected regencies (Lumajang, Pasuruan, Malang, and Tulungagung). Analytical rigor was ensured through the application of Miles and Huberman's interactive analytical model, which encompasses data collection, reduction, display, and conclusion derivation and verification. The study underscores the imperative to amplify indigenous voices and integrate local wisdom into mainstream environmental policies and practices, thereby navigating a path toward more sustainable and culturally resonant environmental management paradigms.

1. INTRODUCTION

Environmental issues are a major worldwide concern, with problems such as climate change, deforestation, overpopulation, loss of biodiversity, pollution, and waste disposal resulting from human activities and being prevalent globally [1]. Many countries are currently facing these environmental challenges. The study of environmental issues is closely linked to the problems that arise from human behavior and attitudes toward the environment [2-4]. Other research suggests that people are not only social beings but also ecological entities that depend heavily on the environment [5, 6]. It is essential for humans to consider an approach to environmental utilization that does not compromise the well-being of future generations [7, 8]. The values shared between humans and nature, their interactions, and the mutually beneficial actions and responses that arise from them indicate that local wisdom in environmental management can have a significant impact on environmental sustainability [9]. While nature can persist without humans, humans cannot survive without nature, as they depend on it for their very existence.

Therefore, protecting the environment requires wisdom.

The environment should not be affected by human beings. Several studies have been conducted to investigate local wisdom as part of environmental awareness initiatives, one of which is *memayu hayuning bawono* as the perspective of the Javanese people who have high respect for ecological principles. *Memayu hayuning bawono* is inspired by Javanese philosophy that is grounded in the concepts of *memayu* and *hayuning bawono*. *Memayu* can be perceived as protecting against any potential threats to security or preventing discomfort caused by certain circumstances. The term "protecting" refers to the concept of *hayuning bawono*, which encompasses the concepts of ensuring safety and preserving the world [10, 11]. *Memayu hayuning bawono* might be seen as the act of protecting or conserving the world from potential harm, or alternatively, as the act of enhancing the world's beauty by embracing everything that it contains.

The local wisdom of *memayu hayuning bawono* contributes to environmental sustainability [12]. Efforts are currently needed to attract people who care for and appreciate the environment, one of which is through education [13], both formal and non-formal education. Education is the transfer of both knowledge and character, including the character to have

a culture of caring for the environment and making it more attractive.

Memayu hayuning bawono is a form of diverse local wisdom that is the origin of Javanese local wisdom [14]. This was used as a guideline to manage the environment by a group of people on Java Island and in Indonesia in general. With improved environmental conditions, communities will be wealthier.

The Javanese have a description of their attitude toward nature around them, with various cultural styles in managing their natural resources. This opposes the idea that natural resource management is for personal gain and groups or referred to as community resource managers. The interests of individuals and groups are to provide for their own livelihood and maintain the existence of the community as a whole. The necessities of existence include both primary or fundamental needs and secondary or supplementary needs. Food, clothing, and shelter are examples of primary needs, while education, transportation, and supplementary daily living are examples of secondary needs.

According to Ch [15], the concept of nature for the Javanese is represented in the first row or scene in the *wayang* (traditional puppet show), when a puppeteer provides insight into the natural beauty, prosperity, and authority of a country by placing two mountains to the right and left sideline as a symbol of the mundane nature [15]. The way of this show presenting all kingdoms and the kings can be said to be stereotyped. Endraswara [16] argued that the Javanese already have a genuine intelligent acting base, which is a summary of life defenses known as "*memayu hayuning bawono*". According to Widiyanto and Iwan [17], an ideology in a cultural system is a belief that serves as a justification and a means of gaining access to various social resources (socio-political-resources). According to Widiyanto and Iwan [17], a number of individuals and organizations that utilize natural resources have already established programs or a series of activity plans [17]. In addition, there are other uses that have existed historically for an extensive period of time and which follow ecological principles.

Endraswara [16] argued that "*memayu hayuning bawono*" is an attempt to protect the physical and mental safety (welfare) of the world, which is associated with Bawono. Koentjaraningrat, cited in Endraswara [16], provided reference to "*memayu hayuning bawono*" in the chapter on the relationship between humans and nature, where the Javanese feel obligated to "*make hayuning bawono*" or beautify the beauty of the world because only this gives life meaning [16]. Koentjaraningrat also stated in the abstract that individuals are obligated to preserve and enhance their spiritual environment, including their customs, practices, and personal ideals and values. This view promotes the belief that human existence cannot exist apart from the environment. Humans, according to the Javanese, should be mindful of their environment, not cause damage it, and act carelessly.

According to Endraswara [16], local wisdom can be described as a mass of meaning containing connections of meaning and millions or billions of meanings [13]. Local wisdom is also described as a well in that its meaning does not run dry, even during the dry season. *Memayu hayuning bawono* is a local wisdom that serves as the foundation of Javanese local wisdom. *Memayu hayuning bawono* is transformed into a local wisdom that can change dynamically with the circumstances at any time, thereby enhancing the wisdom of Javanese people in an effort to beautify the world

through various strategies. It is evident that the rapid progress that has occurred thus far has succeeded in raising the standard of living of some people. The rise in living standards was accompanied by an increase in the quantity, variety, and quality of needs. Therefore, there is competition to increase production for the market. Additionally, productivity was raised without consideration for the maintenance of environmental functions [18].

The increasing needs of human beings as individuals and groups must be balanced with consideration in managing natural resources. This wisdom is required to prevent the degeneration of natural resource quality. The decision-making is typically considered or believed to have taken a wise, correct, appropriate, fair, harmonious, and harmonious decision, after considering and tracing various information, knowledge, and experience, as well as the interests of various parties [18, 19]. There are numerous strategies for environmental management.

In the prevailing context of burgeoning environmental dilemmas grappling multiple nations, the role of human behavior and attitudes toward the environment has been substantiated by numerous studies [2-4]. Albeit humans are not merely social entities but also ecological beings, critically tethered to the environment [5, 6], there persists a substantial research gap in comprehending how deeply ingrained cultural wisdom, such as the Javanese "*memayu hayuning bawono*", influences and navigates these behaviors towards ecological sustainability [12]. While previous research has explored local wisdom as an adjunct to environmental awareness, the nuanced understanding of its practical implementation, impact, and scalability in contemporary ecological management, particularly in the face of modern environmental challenges, remains starkly uncharted. Consequently, this research aims to: 1) meticulously unravel the manifestation, application, and impact of *memayu hayuning bawono* within Javanese communities, and 2) construct a robust framework that integrates *memayu hayuning bawono* principles with modern environmental management strategies, potentially offering a sustainable, culturally-resonant paradigm for other communities globally.

As humans and nature symbiotically share values and enact mutually beneficial actions and responses, the intrinsic local wisdom in managing the environment becomes pivotal in anchoring environmental sustainability [9]. While nature can perpetuate without humans, the converse is not true, emphasizing the imperative of astute environmental stewardship for human survival. Despite a slew of studies investigating local wisdom, such as *memayu hayuning bawono*, as a beacon of environmental sustainability [12], and acknowledging the potential of education as a conduit for fostering environmental stewardship [13], a coherent, scalable strategy integrating these aspects remains elusive. MHB, emblematic of the diverse local wisdom originating from the Javanese ethos [14], provides a unique lens to explore and potentially amplify sustainable environmental management practices. Simultaneously, it necessitates an exploration into the Javanese perspectives towards nature, their diverse cultural practices in managing natural resources, and their collective vs. individualistic approach towards resource management. By ensuring that the implementation of local wisdom does not impair the fulfillment of both primary (e.g., food, clothing, shelter) and secondary (e.g., education, transportation) needs, this research endeavors to carve a pathway towards enhanced environmental conditions and, consequently, enriched

communities.

While Ch [15] and Endraswara [16] delve into the cultural and philosophical aspects of the Javanese worldview, particularly emphasizing the symbolic representation of nature and the intrinsic indigenous wisdom of "memayu hayuning bawono" [15, 16], the lacuna in understanding how these cultural and philosophical paradigms can be effectively translated and integrated into tangible, sustainable environmental management practices is palpable. Notwithstanding that ideologies in cultural systems serve as vehicles for justification and access to socio-political resources [17], and despite historical adherence to ecological principles by individuals and organizations utilizing natural resources [17], the comprehensive, systematic, and scalable application of *memayu hayuning bawono* in contemporary environmental governance and management amidst modern challenges persists as a significant research gap. Therefore, this research seeks to: 1) decode the pragmatic applications of *memayu hayuning bawono* in managing and preserving environmental quality amidst the escalating needs and demands of society; and 2) formulate a cohesive framework that synergizes *memayu hayuning bawono* philosophical principles with contemporary environmental management strategies, offering a culturally resonant, sustainable model.

Endraswara [16] elucidated that *memayu hayuning bawono* is not merely a philosophical construct but an actionable guideline for ensuring the physical and mental welfare of the world. While *memayu hayuning bawono* implores to beautify and give life meaning through responsible environmental stewardship, the critical inquiry into how these philosophical tenets is dynamically transformed and adapted into actionable, impactful environmental management practices remains unexplored. Furthermore, in the wake of rapid progress and elevated living standards, which invariably amplify the quantity, variety, and quality of human needs, thereby intensifying the production competition and potentially sidelining environmental conservation [18], a strategic, culturally grounded environmental management approach is paramount. Although various environmental management strategies exist, discerning a strategy that is intrinsically aligned with Javanese local wisdom, and that holistically considers the preservation of environmental functions amidst the drive for increased productivity, necessitates a deeper exploration and understanding.

This research is based on local wisdom as an alternative for solving environmental issues. Several studies indicated that environmental movements based on local wisdom play a crucial role in stimulating social responses to climate change and environmental issues [20]. This study differs from earlier studies in that it aims to clarify how local wisdom, particularly *memayu hayuning bawono*, can be applied in different settings while also trying to minimize environmental issues to conserve the environment and make the environment more sustainable.

2. METHOD

2.1 Research design

This research embarks upon a meticulous journey utilizing a descriptive qualitative methodology to explore and comprehend the environmental management strategies ingrained in the local wisdom, specifically "memayu hayuning

bawono," within diverse regions in East Java, Indonesia. The descriptive qualitative approach was meticulously selected for its profound ability to facilitate a holistic exploration and rich understanding of phenomena by delving into the multifaceted dimensions of the local wisdom and its tangible impact on environmental practices, without deploying numerical or statistical techniques [21, 22]. This method foregrounds the importance of narrating and interpreting phenomena within their natural settings, hence, providing an enriched, contextually grounded understanding of the interplay between local wisdom and sustainable environmental management.

The research journey was navigated through four distinctive regencies within East Java: Lumajang, Pasuruan, Malang, and Tulungagung. In each region, the study was dedicated to obtaining an in-depth insight into how "memayu hayuning bawono" - a philosophical concept that emphasizes the harmony of life through balancing the relationship between humans and nature - is pragmatically applied and woven into the fabric of environmental management strategies and practices. This involved immersive data collection procedures, encapsulating detailed observations, intensive interviews, and document analysis, ensuring a nuanced understanding of how local cultural values and philosophies shape, inform, and enhance sustainable practices within these communities.

The study began with in-depth data collection in East Java, Indonesia where environmental management utilizes the local wisdom of *memayu hayuning bawono*. This research conducted in the following areas: Lumajang Regency, Pasuruan Regency, Malang Regency, and Tulungagung Regency. The research location covers several areas, namely the Sumbermujur Bamboo Forest in Lumajang Regency, the Putuk Truno Waterfall and Grandpa Bodo Waterfall in Pasuruan Regency, the Boon Pring and CMC Tiga Warna Beach in Malang Regency, and the Telaga Buret in Tulungagung Regency.

2.2 Data collecting technique

This study used a qualitative methodology. The following data collection methods were used: (1) observation, to learn about the ecological and cultural conditions of the community being researched, as well as the environmental management process; (2) in-depth interviews; (3) a documentation study to collect important data about the subject and object of research. Data were collected through direct observation and in-depth interviews at locations where *memayu hayuning bawono* was used to manage the environment. Then conducted in-depth interviews with the administrators of each of these locations, as well as local community leaders and environmental activists.

2.3 Data analysis

Environmental management groups were the primary data sources for this research. An interactive analysis approach developed by Miles and Huberman (2002) and Moleong (2004) was selected to analyze the research data. Data analysis used data from in-depth interviews using an interactive analysis model developed by Miles and Huberman (Miles, 2014), which contains: (1) data collection, (2) data reduction, (3) data presentation, (4) conclusion drawing and verification. Verification or confirming the accuracy of each collected data is necessary so that, at the conclusion of the research phase, the researcher can draw accurate conclusions based on the focus or research problem.

Several criteria were used to ensure the validity of the data obtained during research activities: (1) the degree of trust was determined using in-depth observation, triangulation, and member-checking to meet these criteria; (2) transferability, to achieve this requirement, the researcher tries to describe in detail, thoroughly, carefully, and in depth as long as the subject matter is examined, so that the data acquired and the researcher's interpretation can be differentiated; (3) dependency, the researcher carefully re-examines components, techniques, and study outcomes to ensure data accuracy; and (4) reliability, this level of certainty regarding environmental management in a particular location is confirmed to a number of environmental visitors.

3. RESULT AND DISCUSSION

The following are the results of the identification of the culture of Java people in Lumajang Regency, Pasuruan Regency, Malang Regency, and Tulungagung Regency, which manage their environment using the local wisdom of *memayu hayuning bawono*. The findings of this study are presented along with methods of implementing environmental management based on local wisdom of *memayu hayuning bawono* and environmental preservation in different research areas.

3.1 Sumbermujur bamboo forest in Lumajang Regency

Sumbermujur is located on the foothills of Mount Semeru, specifically in Umbulsari Hamlet, Sumbermujur Village, Candipuro District, Lumajang Regency. Sumbermujur is a natural tourism destination that promotes bamboo forest conservation by incorporating local beliefs and local wisdom for the preservation of water sources. Even though the Dutch colonial government initiated the development of the bamboo forest to preserve local water sources, the community of Sumbermujur Village continues to do the conservation by maintaining the area's sustainability. The view of bamboo forest in Sumbermujur Village is shown Figure 1.

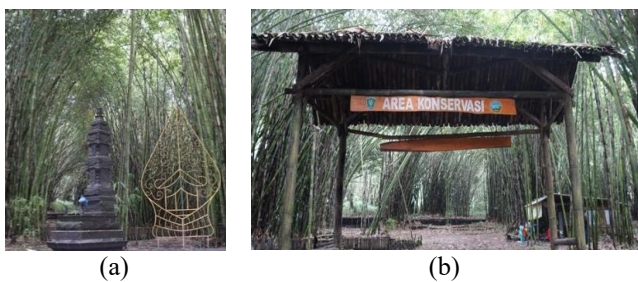


Figure 1. The view of bamboo forest in Sumbermujur Village: a) conservation area of bamboo forest; b) the entrance of bamboo forest in Sumbermujur Village

The community of Sumbermujur believes that the water source channel beneath the Sumbermujur forest reaches the Semeru slope. Thus, the people of Sumbermujur Village are obligated to plant bamboo to maintain the proper flow of water in their area. The people of Sumbermujur Village are obligated to preserve the bamboo forest due to the urban legend that if they do not, they face terrible consequences. This is also supported by village policy No. 1 of 2000, which regulates the management of bamboo forests, and village policy No. 5 of 2007, which regulates the preservation of flora and fauna in

the bamboo forest. Thus, the people of Sumbermujur Village will be much more cooperative with the regulations and management in the bamboo forest. The condition of the water source in Sumbermujur Village is shown in Figure 2.



Figure 2. Water source at Sumbermujur

People of Sumbermujur Village additionally engage in conservation practices in the form of local wisdom in along with keeping to the rules for growing bamboo and the prohibition against chopping bamboo without any particular reason. Community members support the environmental sustainability of the Sumbermujur bamboo forest in accordance with *Nyadran* ritual (grave cleaning tradition). The *Nyadran* ritual is a type of local wisdom that is practiced while the atmosphere of the springs in Sumbermujur is cloudy. The people of Sumbermujur Village believe that the cloudy presence of the springs indicates the arrival of bad luck. People of Sumbermujur Village bury the skulls of cows near the springs, bring offerings, and perform the Oling dance (a traditional dance specifically for *Nyadran* ritual) in order to prevent this from occurring.

During this procession, the community will also clean ancestral graves, sow flowers, and celebrate ancestral graves, which are regarded as an expression of dedication to God. The elders will then read a prayer before casting a number of offerings into the spring. The community believes that when a sacred animal named *Oling* (a fish that is believed to have the body shape of an eel and a serpent emerges from a water source), it signifies that the throwing of offerings was successful and will bring blessings to the people of Sumbermujur Village.

3.2 Putuk Truno waterfall in Pasuruan Regency

Putuk Truno Waterfall is located at the base of Mount Arjuno Welirang, specifically in Tretes, Pencalukan Village, Prigen District, Pasuruan Regency, East Java. This waterfall is 45 meters tall and features amazing natural beauty. Putuk Truno Waterfall is a popular tourist destination due to its fast and clear water flow from the summit of the cliff, the dominance of natural forest trees, the presence of a shallow lake at the base, and the abundance of natural rocks. The view of Putuk Truno Waterfall is shown in Figure 3.

At Putuk Truno Waterfall, there is a covered and dense natural conservation park, providing an attractive environment for visitors. This tourist attraction promotes good forest management by planting trees frequently and minimizing cutting down trees in order to preserve the sustainability and cleanliness of the environment surrounding the waterfall. Even though this waterfall is surrounded by dense forest, the Putuk Truno Waterfall is easily accessible, making it convenient for tourists to visit. The view of the forest in Putuk Truno Waterfall is shown in Figure 4.



Figure 3. The view of Putuk Truno Waterfall in Pasuruan Regency: a) Putuk Truno Waterfall; b) the entrance of Putuk Truno Waterfall

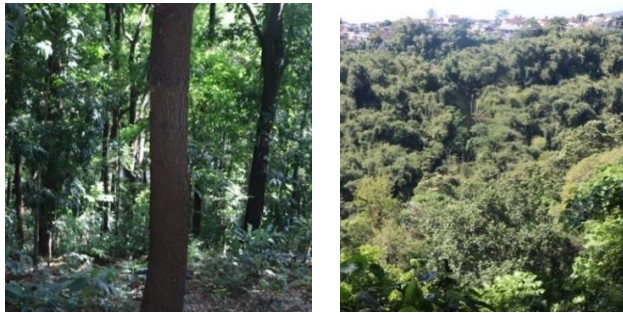


Figure 4. The view of the forest in Putuk Truno Waterfall

Putuk Truno Waterfall has a distinct mythical origin in addition to its beautiful waterfall and forest environment. Putuk Truno Waterfall derives its name from Prince Joko Truno, the son of King Hayam Wuruk and his consort. The narrative begins with Joko Truno, who has an obsession with Putri Sri Gading, the daughter of Duke Raden Arya Wirja of Madura. Joko Truno and Putri Sri Gading were inseparable due to their affection for one another. Raden Arya disapproved of their relationship due to the fact that Joko Truno was not the king and queen's son. Therefore, Raden Arya desired for both of their love ties to break.

One of the ways in which Raden Arya realized this was by isolating his daughter in Coban Baung and isolating the area with supernatural powers so that she could not interact with Joko Truno. Joko Truno continued to adore Putri Sri Gading, and he attempted to meet her by performing tapa brata in front of Sang Hyang Dewa. Joko Truno and Putri's sincere love eventually paid off, and the magical barrier was able to be opened. They were able to retreat to the waterfall, now known as Putuk Truno, where Joko Taruno was meditating. This is where the eternal love between Joko Truno and Putri Sri Gading developed, so Putuk Truno Waterfall is also known as the Waterfall of Eternity. This leads to the belief that if a couple bathes beneath this waterfall, they will establish eternal love.



Figure 5. Truno Cafe with the Motto "An Area Full of Love"

The manager highlights this synergy as the icon of Putuk Truno Waterfall, citing its beautiful forests, waterfalls, and myths. This is evident from the tourism activities of Forest Truno Cafe, which uses the slogan "An Area Full of Love" to attract tourists. In addition to attracting tourists, the manager prioritizes the sustainability of the tourism environment by conducting proper forest management to preserve Putuk Truno Waterfall's sustainability. Figure 5 shows the banner placed in front of Truno Café.

3.3 Mbah Bodo Waterfall in Pasuruan Regency

Mbah Bodo Waterfall is located on the foothills of Mount Welirang, specifically in the Tretes tourist area of Prigen, Pasuruan Regency. The priority of waterfall tourism is to be a tourist attraction with a beautiful waterfall environment and a unique history. Realistically observed, Mbah Bodo Waterfall is distinguished by a high waterfall cliff with a large volume of waterfall discharge from the Kaligetik River and a dammed waterfall flow beneath. In addition, the Mbah Bodo waterfall is surrounded by sustainable management of forests and parks, which contribute to the creation of an attractive tourist environment. The view of Mbah Bodo Waterfall is shown in Figure 6.



Figure 6. The view of Mbah Bodo Waterfall in Pasuruan Regency: a) Mbah Bodo Waterfall; b) the entrance of Mbah Bodo Waterfall



Figure 7. The grave of Mbah Bodo

Tourists may explore Mbah Bodo Waterfall comfortably due to a 1.5-kilometer trekking track and organized access. Tourists can see the bathing pool area at the source of the Mbah Bodo Waterfall from the beginning of the trek. Then, visitors will pass through a long corridor made of tree roots as well as a massive garden with selfie-friendly locations. Finally, tourists reach the grave of Mbah Bodo, which signifies that the waterfall is close by.

The grave of Mbah Bodo is an icon and the source of Mbah Bodo Waterfall. Mbah Bodo Waterfall derives from the legend of Mbah Trimran, who was renowned for his diligence, faith,

and willingness to help others. He was laboring and serving the Dutch colonial family at the time. One day, the king requested permission to leave work to meditate near a waterfall. The purpose of Mbah Triman's asceticism was to appeal to supernatural forces in order to assist those in his community who were experiencing difficulty. The grave of Mbah Bodo is shown in Figure 7.

The Dutch colonial family initially permitted Mbah Triman to leave. However, they were astonished that Mbah had the courage to abandon all the convenient work facilities. The family then approached Mbah Triman to convince him to return to work for them. But Mbah Triman refused and continued to meditate, so he possessed supernatural abilities. The family referred to Mbah Triman as "stupid grandfather" in relation to this. From these words, the waterfall where Mbah Triman meditated was ultimately renamed Mbah Bodo Waterfall and revered by locals as Mbah Bodo's grave.

3.4 Boon Pring Andaman di Malang Regency

Sanankerto Tourism Village is located in Sanankerto Village, Turen District, Malang Regency, East Java Province. It is divided into 2 hamlets, namely Krajan Hamlet and Kampung Anyar Hamlet. This Tourism Village has the Boon Pring Andaman as ecotourism destination. In this location, bamboo vegetation represents the abundant natural resources. There are hundreds of species of bamboo in this arboretum. Boon Pring Andaman is commonly known as the largest bamboo laboratory. Because there are numerous varieties of bamboo plants in the area. The Boon Pring Andaman ecotourism area covers 36.8 hectares, of which approximately three hectares is a bamboo forest. While in the center is a natural pond where boats can be operated. The view of Boon Pring Andaman is shown in Figure 8.



Figure 8. The view of Boon Pring Andaman as a tourist destination

This Boon Pring tour has been running since the 1980s. However, since the Grebeg Sesucen Desa event in 2014, this natural bath has gained in popularity. Since 2015, the tourism potential of the region has been actively managed. Located on the foothills of Mount Semeru makes the air in the tourist destination of Boon Pring feels cool. Furthermore, this area is now more organized. The availability of toilets, bathrooms, prayer rooms, places to eat, swimming pools, and lots of parking will not prevent guests from appreciating the environment. Therefore, the Boon Pring area serves as both a tourist destination and an arboretum or a laboratory for the study of bamboo development. There is more than one lake in Boon Pring. Six water sources are accessible to visitors: Sumber Adem, Sumber Seger, Sumber Towo, Sumber Gatel, Sumber Krecek, and Sumber Maron. Sumber Adem and

Sumber Towo are the two major lakes in the area. Meanwhile, Sumber Maron is administered as an independent tourist attraction. Sumber Towo is the first lake in Boon Pring, and it used to be believed to have curing powers. Sumber Gatel is known to have irritating water, but it can be remedied with Sumber Towo water. Sumber Seger and Sumber Adem contain refreshing water. Sumber Krecek derives its name from the 'krecek-krecek' sound of the water flow. This lake is home to a variety of freshwater fish species. Some examples are koi, tilapia, and goldfish.

In this tourist village, there are a number of tourist attractions, including the Ademan Embung, a water source used to irrigate 124 hectares of agricultural land, as well as the traditional activities of Grebeg Sesucen and Alms Earth. Grebeg Sesucen is an event conducted every month of Syuro as an expression of gratitude to the Almighty. While *Sedekah Bumi* is a traditional event, it begins with all residents of the tourist village of Sanankerto transporting the tumpeng from the Village Hall to Andaman. The tourism potentials in Boon Pring area are detailed in Table 1.

Table 1. Potential for tourism in Boon Pring

Natural Potential	Cultural Potential	Attraction Potential	Economic Potential
1. Andaman Lake	1. Grebeg Ritual 1001	1. Outbound Area	1. Phinisi ship replica craft made of bamboo
2. Boon Pring Tourism Forest	2. Bull Art	2. Swimming Pool	2. Cigarette Ashtray Craft
	3. Stilts Parade	3. Ancient sites	3. Miniature bamboo tree craft
			4. Woven bamboo
			5. Sculpture carved from bamboo roots

Furthermore, the people of Sanankerto Village have local wisdom called Adat Brubuh, which is essential to the sustainable maintenance of the bamboo forest. One of them utilizes Brubuh rituak. Brubuh is a traditional forestry system that incorporates calculations from the Javanese agricultural calendar, specifically Pranata Mangsa. Brubuh applies the concept of logging that is not done at random but at specific periods of year. In Pranata Mangsa, there are twelve different seasons. According to the Brubuh concept, logging occurs in the ninth, tenth, and eleventh seasons. March to mid-May is the usual period (interview results, 2023).

In the development of an ecotourism-based tourism village in Sanankerto Village, the government and the community are working to preserve and protect the ecosystem, particularly the bamboo forest ecosystem. The natural potential of the Boon Pring bamboo forest ecosystem includes its utilization as a tourist destination. The conservation effort seeks to preserve a spring because the inhabitants of Sanankerto Village depend heavily on the Embung Andaman's water supply.

The farmers group of Boon Pring Bamboo is the primary actor in the conservation of bamboo forests in order to protect bamboo and spring water sources in a sustainable way. It is also equipped with a bamboo conservation work plan and a division of responsibilities for maintaining and caring for bamboo forests. Its primary objective is nature conservation. In addition, the water reservoir in the Boon Pring area

presently serves as a breeding ground for up to 22 species of endemic freshwater fish in East Java. The location of Boon Pring bamboo forest is shown in Figure 9.



Figure 9. The special location in Boon Pring is designated as an arboretum or botanical garden for research and education that established in 2015

In addition to being used for residents' daily activities, the springs in this region serve as swimming pools and habitats for native endemic species (East Java). There is one large pond that is exclusively used for fish farming. There are numerous varieties of local fish, all of which are the result of hatcheries and breeding of fish from different regions of East Java. The Fish Bank is shown in Figure 10.



Figure 10. Local Endemic Fish Bank in East Java

The abundant sources in this area are not only used for fish conservation, but also as a Micro Hydro Power Plant. Multiple organizations and associations have worked together to construct a Micro Hydro Power Plant in the Boon Pring Ecotourism area. Several organizations, including the Malang District Government, University of Muhammadiyah Malang (UMM), Bank Negara Indonesia (BNI) Malang Region, and Village Owned Enterprises (BumDes) of Kerto Raharjo, participated in the construction of this Micro Hydro Power Plant. This Micro Hydro Power Plant is powered by a capacity of 0.50 m³ per second of water withdrawal from the Andeman water source, which generates 20,000 watts of electricity for local residents and ecotourism activities in Boon Pring.

3.5 Clungup Mangrove Conservation (CMC) in Tiga Warna Beach at Sendang Biru, Malang Regency

In addition to its natural attractiveness, Tiga Warna Beach has regulations that are conservative and instructive to tourists about the importance of maintaining cleanliness and preserving the environment. This coastline is part of the rehabilitation and conservation area of mangroves, coral reefs, and protected forests in Sitarjo Village, Sumber Manjing Wetan District, Malang Regency. This coastline has 15 features, including (1) The water has three distinct colors, (2) the coral reefs and marine life are still preserved, (3) the

snorkeling area is amazing, (4) divers are required to wear a life jacket, and (5) the sand is pure white, (6) only 100 visitors per day are permitted, (7) must reserve in advance, (8) every visitor is required to be accompanied by a guide, (9) waste regulations are extremely strict, (10) visit time is only 2 hours, (11) only accessible on foot from the parking area, (12) no camping area, (13) surrounded by forest, (14) no public transportation, and (15) located in the same location as other beaches: Tiga Warna beach, Gatra beach and Clungup Beach. The view of Tiga Warna Beach is shown in Figure 11.



Figure 11. The view of Tiga Warna Beach

The administration of Tiga Warna Beach implements a reservation system and visitor restrictions. The entry quota to tourist attractions cannot exceed 100 people per session, and the group quota cannot exceed 10 persons. Before visiting Tiga Warna Beach, potential visitors are required to make reservations through social media and the telephone. In addition to the rules implemented by the Tiga Warna Beach manager, every visitor must employ the services of a local tour guide, whose duty is to accompany visitors and serve as a role model while they are at Tiga Warna Beach. The Tour Guide will also remind tourists if they later engage in activities that threaten the natural preservation of Tiga Warna Beach. The manager conducts an item inspection, focusing on potentially wasteful food and beverages. All of these items are then recorded and returned in order to maintain the beach's cleanliness and sustainability.

The management of the CMC Tiga Warna Beach based on Community-Based Tourism (CBT) involves the surrounding community in preserving the existing environment so that this tourist area can be maintained and enjoyed by future generations. Additionally, the administration of CBT tourist areas is intended to boost the economy of the neighboring community. The Bakti Bhakti Alam Sendang Biru Foundation manages this beach using a conservation strategy. This is evident by the fact that a portion of the revenue from ticket sales is used to plant trees in this coastal tourism area. In addition, it establishes a daily visitor limit and ensures the cleanliness of tourist attractions. With the assistance of non-governmental organizations, the Bakti Alam Foundation manages the coastal area in order to increase income and generate jobs for the surrounding community.

The results indicated that the implementation of CBT in the CMC Tiga Warna Beach area was excellent, as evidenced by the participation of group members in all aspects, the improvement of group members' quality of life, and environmental sustainability. In addition, the economic impact on the surrounding community has been positive, as evidenced by the availability of funds for groups, the creation of job

opportunities, the increase in local income, and a fair distribution of profits.

The study's findings indicate that, in general, the principles of community-based ecotourism have been effectively implemented. In management considerations, the principle of nature conservation has been given significant attention. The principle of community participation is beneficial and must be maximized through collaboration with all local community levels. The application of economic management principles has resulted in an increase in the economy as a result of ecotourism activities, thereby increasing welfare. The principle of education is beneficial, and it is necessary to continue increasing waste management, mangrove conservation, and coral reef conservation creations. Regional differences and local knowledge must be highlighted. In accordance with research [23, 24], the provision of additional amenities needs to be enhanced.

There are three alternative strategies for developing this tourist attraction: (1) optimizing all existing potential to achieve sustainable tourism management; (2) involving various parties to cooperate in efforts to increase, repair, maintain, and optimize ecotourism; (3) increasing existing tourist attractions by improving the quality of integrated facilities and infrastructure to increase their competitiveness in attracting tourists; and (4) development of tourism facilities [25]. The location of CMC Tiga Warna is shown in Figure 12.



Figure 12. The structure of CMC Tiga Warna Beach for Sustainable Tourism Management

3.6 Buret Lake in Tulungagung Regency

The existence of karst areas in Indonesia has been considered to have significant strategic value. In addition to comprising nearly 20% of Indonesia's total land area, karst has unique and abundant natural resources, both living and nonliving [26]. Karst structures that must be protected are cave edges. This form of cave protection should not involve construction near the cave's border, as this would damage the cave's decorations (stalactites, stalagmites, flowstones, etc.) and pollute the underground river. Boundary to springs, the existence of springs must be preserved in a sustainable manner by employing indigenous local knowledge, so as not to affect its potential depletion [27].

Tulungagung is one of Indonesia's karst areas. The soil,

which consists of limestone rocks and covers an area of 1,500 km², has endo and exokarst potential, as well as endokarst potential in the form of hundreds of caverns. Only 16 of the numerous caves in the Tulungagung Regency area have been identified and mapped, including fossil caves (dry) and caves with subterranean flow potential [28].

Buret Lake is one of Tulungagung Regency's tourist attractions. This lake is located approximately 25 kilometers from the center of Tulungagung City in Sawo Village, Campurdarat District, Tulungagung Regency. The lake's total area is approximately 400 square meters². Even though it is quite small, this lake is unique in that it is a source of water that can flow to the four nearby villages, allowing locals to plant rice throughout the year in both the rainy and dry seasons. It is believed that this condition will persist for a very long time as long as the environmental conditions surrounding the lake are preserved and sustainable.

The lake is the primary attraction at the Buret Lake tourism destination. This lake is fed by a subterranean watercourse in the Kars Mountains. Additionally, there is a river that creates a waterfall and flows into Buret Lake to replenish it. The ideal time to visit Buret Lake is during the summer or when it rarely rains. At this time, the water of Buret Lake is not cloudy brown, and tourists can appreciate the lake's blue water. Not only blue, but occasionally the lake water appears emerald green as well. This lake's vibrant color is influenced by its location in the Limestone Mountains. Several species of fish, including cork fish, sepat, and ducklings, inhabit the lake. The nearby community protects these fish so that their population remains sustainable. The view of Buret Lake water source is shown in Figure 13.

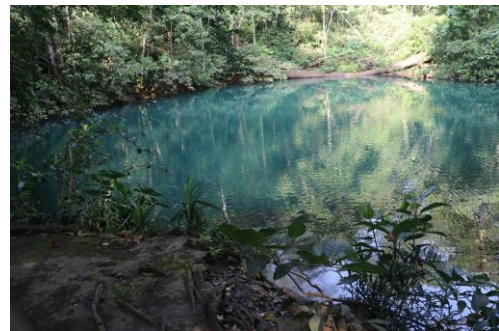


Figure 13. View of Buret Lake Water

Buret Lake is located in the Limestone Mountains, so the presence of a water source in this region is exceptional and worthy of gratitude. The residents of four villages, Sawo Village, Gedangan Village, Ngentrong Village, and Gamping Village, distribute the water from Buret Lake to their paddy fields. There are approximately 700 hectares of agricultural and industrial land. Formerly, the rice fields were harvested once per year, but now there are three harvests per year. Jokowi (recent President of Indonesia) presented Kalpataru (special award for the environment) to nature activists at Buret Lake in 2015 and in 2014 received provincial level of Kalpataru.

Sawo Village, Campurdarat District is home to the Buret Environmental Conservation Park, whose purpose is to preserve water sources. People who participate in water conservation can be divided into two groups: the elderly and the youth. The old group protects the area by preserving uncommon sacred plants, sacred fish that inhabit water sources, and sacred monkeys. Meanwhile, the youth group

planted trees in the area and on the mountain, which is the water catchment area for numerous rare plants. There are various varieties of plants, including the Ingas tree (which is considered sacred and whose sap can cause a burn if it comes in contact with the skin), Trembesi, Water Guava, Sengon, Flamboyan, Candlenut, etc. This park is located on a west-east limestone hill with a spring in the fault infraction. Three surrounding villages utilize the water from the Buret Water Source to irrigate their rice fields.

There are currently 179 plant species in the Buret Lake area, including Gentong, Sole (very large), Pucung, Banyan, Bendo, Kemaduh (poisonous), Awar, Tuwingan, Gembilina, Rukem, and Ringin. Development of native habitat is carried out annually between January and March through routine planting.

According to the type of flora present at the location, there are numerous ape species. Based on the behavior of these animals, which do not appear to be disturbed by the presence of humans, it is certain that the local community has not hunted these animals, resulting in a large population of monkeys in this area. In addition, numerous species of birds, including finches and cendets, were discovered in the area. Occasionally, reptiles such as monitor lizards, lizards, and snakes can be found around the lake. The location of ape's habitat in Buret Lake is shown in Figure 14. Burret Lake is a protected local area. The ulur-ulur tradition for preserving water sources in Buret Lake. The lake contains catfish, bulus, and bandher bang, according to local wisdom. The ulur-ulur tradition is an implementation of memayu hayuning bawono, where local wisdom serves as a fundamental aspect in the conservation of the environment.



Figure 14. Ape habitat in Buret Lake

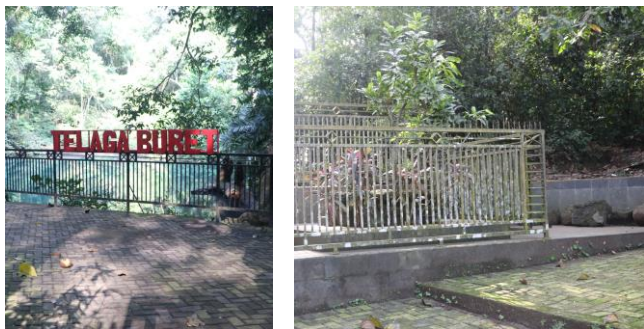


Figure 15. Location of ulur-ulur ceremony procession

The ulur-ulur traditions originated from a legend that developed in the ancient community during a long period of drought, causing the villagers unable to harvest crops. The four villages located in Campurdarat Tulungagung District are Sawo Village, Gedangan Village, Ngentrong Village, and Gamping Village. Therefore, community suffers starvation. Since the rice fields in the Campurdarat District have not encountered drought since Telaga Buret's creation, the ulur-

ulur rite is also an expression of gratitude and respect to God Almighty for Dewi Sri and Joko Sedono, as symbols of farmer prosperity. Thus, the community conducts the ulur-ulur Tradition every year on Friday Legi Bulan Suro. This tradition of ulur-ulur honors Grandmother Jigang Joyo and her offspring and in-laws, Sri Rejeki and Sri Sedono. They are responsible for Buret Lake's existence and utilize its water to irrigate paddy fields. The tradition of Ulur - Ulur involves adorning and bathing the statues of Dewi Sri and Joko Sedono. Then there is the tayuban accompanied by onang-onang music, the procession of little companions carrying rice, the reog drums, and the flower planting at Lake Buret. The location of ulur-ulur ceremony procession is shown in Figure 15.

Based on the results of interviews with local managers, it has been determined that the condition of the lake has improved for seventeen years ago, which is extremely concerning. From 1998 to 2000, the community engaged in extensive forest harvesting, which impacted the condition of Buret Lake. Originally, Buret Lakewas known as a tortoise, bat, and monkey sanctuary. These animals began to vanish over time. This is accompanied by the condition of the lake's water, which is receding. Then, the community devised a plan to improve the condition of the lake through reforestation, integrated management, and local wisdom activities, such as the annual ulur-ulur cultural event conducted on the last Friday of the month of Suro. The condition of Buret Lake has gradually returned to normal, and it is now outfitted with a variety of amenities, including parking lots, restrooms, play areas, and an information office. This result shows that local wisdom can be important in resolving ecological issues. Local wisdom serves as an approach to address environmental issues, as it contributes in transforming the attitudes and behaviors of people in the communities [29, 30]. This is supported by a variety of comprehensive interviews that have been carried out with residents, as described below.

Karsi Nero Sutamrin, a member of the East Java Pioneer Youth, stated that if we are kind to nature, then nature will be kind to us. "If you cut down a tree, you will feel guilty, but if you plant a plant, it will provide you with numerous benefits and rewards." Karsi Nero Sutamrin is the leader of the Green Environment Group and the Tourism Awareness Group (Pokdarwis). Discovering a place's culture is so fascinating, the Buret Lake sanctuary is still being maintained by the community. Near the entrance to Buret Lake, visitors are greeted by a troop of primates and a herd of deer.

The existence of Buret Lake cannot be separated to the Ulur - Ulur tradition as a manifestation of the locals' gratitude to the creator. According to Sumini (96), one of the traditional village elders, Buret Lake has become the livelihood of the local community. This lake has been enchanting at least the villages of Sawo, Gedangan, Gamping, and Ngentrong for hundreds of years. Even though it is a small stream, the water never stops streaming into the residents' rice fields, despite its small size.

This blessing that the residents have felt for generations is the reason why they always conduct a thanksgiving ceremony known as ulur-ulur. This ceremony featured the demonstration of various Javanese arts and concluded with the sowing of flowers into the lake. However, this is not just a relaxing ceremony. To maintain the flow of water from Lake Buret, the residents of the four villages preserve the natural environment, including a prohibition on cutting down trees around the lake. Local wisdom, which comes from Javanese philosophy (memayu hayuning bawono), is an example of local wisdom

that not only follows to the ulur-ulur tradition but also uses environmental values as a symbol to show how environmental perceptions and values are applied in culture [31].

Moreover, other method of conserving Buret Lake is by imported a different freshwater species into the lake, supported by the community. It is not surprising that wild animals such as monkeys reproduce near the lake. Residents established the Sendang Tirto Mulyo Association, which ensures the lake's sustainability. Respect the three ancestors by preserving the lake's ecosystem. Buret Lake is considered sacred and filled with mysticism, but it has provided numerous benefits to the surrounding community [32].

Before conducting the ulur-ulur ceremony, communities usually make preparations for offerings. Mbah Sami, a parent who has been preparing for the ulur-ulur ceremony for 15 years, stated that for each ceremony, the people of the four villages must prepare, send, and make offerings. The offerings consist of *cok bakal* (rice covered with banana leaf), snacks, *lodho rice* (rice covered with coconut milk), *sega gurih*, and so forth. After the reading of the prayers, all the food was distributed to those in attendance, and a small portion was given to the creatures in the lake, which included fish, turtles, and monkeys. All participants in the offering ceremony are required to try the cuisine. As a sign of reverence for the inhabitants of this lake, the leader of the ritual offerings always requests that you try a small portion, regardless of your preference.

A procession of numerous offerings from the house of the local village chief to Buret Lake begins the ulur-ulur ritual. On the edge of Buret Lake, directly next to Mbah Joyo's grave, all offerings are placed at this location. Over the tomb of Mbah Joyo, reciting mantras and burning incense. After reciting the prayer, the principal ritual leader washes the two statues of men and women. According to the ritual commander, the two statues represent Mbah Joyo's son-in-law and son, Sri Rejeki and Sri Sedono. As a sign of respect for their ancestors, locals maintain the lake area with trees and wild animals. The ceremony concludes with the distribution of banana and cake offerings. This is the moment that residents and anyone attending the ritual have been anticipating. Because whoever consumes cake or numerous offerings will have his genuine wish granted [33].

When performing the ceremony, a procession is conducted. The ceremonial party left the location of preparations. Four districts have sent four food baskets (*jodang*) to the front. Two individuals carry the *jodang*, one in front and one in back. Behind them were guards carrying spears and lit incense containers. Behind them are two additional women bringing "*manten*" clothing equipment. Followed by a group of attractive young women carrying bowls of colorful, sliced flowers to throw in the lake. The next in line are the village and district elders, as well as the traditional ceremonial leaders. The final row contains *solawatan* (prayers) with *tambourines*. It has a sacred but also distinct appearance. It feels dense with mystique due to the manner in which it is presented as being holy. Unique because those in front were dressed in Javanese attire and carrying offerings, while those in the back were *solawatans*.

This proved to be intentional. The local community was once opposed to Kasepuhan's role as superintendent and savior of the Buret Lake ecosystem. Their actions are viewed as contradictory to Islamic principles. Finally, religious leaders from diverse communities were invited. It is aimed to let everyone engage in environmental protection efforts.

Therefore, this customary ceremony was executed.

Studies conducted in various locations have shown that local wisdom significantly affects environmental issues [34]. Local wisdom refers to the knowledge that is derived from diverse experiences and the collective understanding of individuals within a certain place [35, 36]. Local wisdom, which comprises rooted beliefs, is fundamental to the continued existence of a community in line with its environment and needs [32]. Local wisdom plays a crucial role in establishing comprehensive sustainability in terms of the environment, culture, and economy [36]. The philosophy associated with *memayu hayuning bawono*, which translates to "environmental preservation," serves as the foundation of Javanese society's implementation of local wisdom [20], as an understanding of ecological processes requires knowledge of natural culture and many details related to ecological processes.

4. CONCLUSION

The research results indicate that the Javanese people's philosophy of *memayu hayuning bawono* serves as the foundation for the community to engage in the practice of local wisdom, which contributes to the conservation and preservation of the environment. This is shown by one of the traditions of ulur-ulur on Buret Lake, where people participate in this practice as a means of expressing thanks and trying to protect the environment, so minimizing the frequency of drought for the community. In the future, further research can be conducted to explore the importance of local wisdom values using a comprehensive methodology. There are numerous local wisdom values that can serve as valuable learning resources to solve environmental issues, particularly in Indonesia.

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