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NEEDS AND CONCEPT ANALYSIS OF ENVIRONMENTAL MONOGRAPH DEVELOPMENT BASED LOCAL WISDOM IN PROBOLINGGO

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Abstract. The problem in the field is that there is a lack of integration between the local wisdom of the Tengger community and environmental conservation efforts in the highland, middle and lowland areas of Probolinggo Regency, so a monograph is needed as a medium for developing learning and preserving culture and the environment. This study aimed to determine the needs and concept analysis for developing an environmental monograph based on local wisdom in the Probolinggo. This study used a qualitative descriptive method. The research subject needs to be analyzed by environmental geography lecturers, students, the Bromo Tengger Semeru National Park Center (BBTNBTS), and the local government of the Probolinggo Regency. The research subjects in the concept analysis were key informants from six villages in the Probolinggo Regency. Qualitative data were obtained through observations, in-depth interviews, and documentation. The data analysis was qualitative, using information from qualitative data to analyze the needs and local wisdom in the upland, middleland, and lowland areas of the Probolinggo. The data analysis was then discussed using the monograph challenge and spatial ethnography. The need for environmental monographs based on local wisdom in the Probolinggo Regency was based on the need to enrich learning resources in the Geography Study Program, State University of Malang, the interests of BBTNBTS, and the Probolinggo Regency Government. The concept that emerged from local wisdom was the preservation of land and forests. Sea and water are sourced from local wisdom in gardening, farming, and fishing.

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INTRODUCTION

Field observations show that the upland areas of the Probolinggo Regency in Sukapura District had challenges in utilizing land with steep slopes. Very steep slopes have been used for open vegetable crops. Several points have experienced landslides. Landslides indicate that things must be considered in environmental management, especially soil and vegetation (Salampessy et al., 2021; Sumarmi, 2018).

There were many settlements in the middleland area of the Probolinggo Regency in Lumbang District, and the use of rice fields meant that the green area portion needed to be well maintained. The green zone has many benefits as a buffer area for supplying oxygen, water, soil, and global warming issues (Sumarmi et al., 2021). The community must still fully implement the fish catch release system in lowland areas such as the Probolinggo Regency and Sumberasih District. Limiting fishing time is also essential for preserving marine resources (Hoskins-Brown, 2020).

These challenges must be minimized, and conservation efforts must be enhanced by exploring local wisdom. In this case, local wisdom is still related to activities in each environment or is referred to as ecological wisdom or cultural ecology (Sumarmi et al., 2020). Culture attached to space aligns with spatializing culture because ethnography is related to

space and place (Low, 2016). Geographical space is essential for studying geographic phenomena, including culture (Abas et al., 2022).

Ecological wisdom aligns with the spatializing culture of humans and spatial patterns. The differentiation of cultural-based community activities is reflected in the activities of human communities in managing different environments. Tribes are often found in human communities. Spatial and cultural environmental management are interconnected. The spatial and cultural relationship to spatializing culture can be related to cross-culture (Low, 2016).

The tribes in the Probolinggo Regency, with their unique local culture related to upland, middleland, and lowland environments or ecological wisdom, need to be developed into a monograph. The division of upland, middle land, and lowland environments is based on physiographic units (Low, 2016). The physiographic map of the Probolinggo Regency section shows that the upland area is in the Quaternary Volcano zone, with Mount Tengger and Mount Bromo being the main areas. The top four villages in the upland as research locations were included in the Sukapura District area. These four villages were included in the sand of the sea zone, Tengger Caldera formation (upper and middle slopes), foot slope of Tengger Caldera, and Sapi Kerep outlet valley (Bachri et al., 2015).

Middleland is in the Central Java Depression zone, which has a more sloping form of land-use. The village that was the research location in Middleland was administratively included in the Lumbang District. The lowland is in the Kendeng Anticlinorium zone up to the northern coastline or Madura Strait (Lupi et al., 2022). The village that was the research location in the lowlands was administratively included in the Sumberasih District area. The development of an environmental monograph, based on the local wisdom of the Tengger Tribe, was based on several reviews. The review includes material on the Environmental Geography course, curriculum, and stakeholders related to the importance of the monograph being developed. The relevant stakeholders were the Bromo Tengger Semeru National Park Center (BBTNBTS), which manages the upland environment, and the Probolinggo Regency Government, which covers the entire study area. Needs analysis in development research is the basis for the development of products to be developed (Suastra et al., 2017).

Similar research on the local wisdom developed in research and development is as follows: First, qualitative research on the local wisdom of the Bajo Tribe in marine and coastal conservation continued in the development of teaching materials using 4D (HL et al., 2020). The research results of the teaching materials were suitable for distribution because they met the validity tests and group testing. There were rules when going to sea, traditional ceremonies before going to sea, and other traditional ceremonies that brought the Bajo tribe closer to sea. Second, Ensiyawatin et al. (2021) developed supplementary teaching materials using the Borg and Gall model from ecotourism and natural resource management research results. The research results show that contextual supplementary teaching materials and ecotourism are the best parts of the natural resource management steps that apply sustainable principles. Third, Andriana et al. (2017) developed a book on the local wisdom of the Bedouin tribe in natural science material for elementary schools using the 4D method. Fourth, Hartini et al. (2018) developed physics teaching materials based on'swaba Kawa the local wisdom using the ADDIE model. The results of the research on teaching materials were in the good category.

Fifth, Zafra-Mejía (2023) conducted research on the Emberá Indigenous Reserve in Chocó, Colombia, showcasing how ancestral practices and spiritual connections with natural elements foster sustainable water and land management, highlighting the importance of cultural agents such as Jaibana and elders in ethno-development. Sixth, Melaku & Ivars (2024) studied the cultural ecosystem services provided by urban sacred forests in Kanazawa City, Japan, and illustrated the multifaceted benefits of these biocultural landscapes, including spiritual and communal connectivity, preservation of traditional heritage, and aesthetic values. However, there is a notable decline in the engagement of younger generations. Seventh, Kongprasertamorn (2007) conducted qualitative research on local wisdom in preserving the environment and culture of farming communities in Tambon, Thailand, describing the traditional and sustainable ways of managing natural resources. These research results have

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implications for policy development. Local communities are encouraged to maintain, enrich, and articulate traditional wisdom. These results demonstrate that the community applies local wisdom to resource management and economic development. Eighth, Syarif et al. (2016) studied the culture of pasang ri Kajang in preserving forests in the Ammatoa Tribe, Bulukumba area, South Sulawesi. The forest zone had rules that the tribe must not violate. Ninth, research by Hasriyanti et al. (2017) studied the Punggawa-Sawi culture in preserving flying fish in the Patorani culture using modern equipment and a release system.

Research and information on the local wisdom of more than one tribe in the environmental management of one administrative unit and its use as a monograph with a 4-D development model is still limited. 4-D model is suitable for delivering research results to learning materials (Siagian et al., 2019). Various studies have focused more on community culture. Several studies have addressed environmental management. However, they must still comprehensively examine the environment (mountains, forests, and seas). Several previous studies stopped qualitative studies that were not written in monographs. This research was developed into a monograph using a 4D model. The first stage of development was defined using the 4D model. The 4D model was chosen because the defined stage accommodates research that examines local wisdom, and the remaining 3D stages accommodate research and development. These results showed that the defined stage was preliminary research that can be reported partially and used as a material in the next stage.

The defined stage determines the beginning of development based on needs and concept analyses. Needs analysis regarding why the product needs to be developed (Afriyanti et al., 2021). Concept analysis identifies the concepts that will be included in the product or can be called content analysis (Tunison, 2023). These two analyses were carried out using qualitative research. The first aim of this research was to determine the needs analysis for developing an environmental monograph based on local wisdom in Probolinggo Regency, and to identify local wisdom concepts related to the environment in Probolinggo Regency.

RESEARCH METHODS

This research examines local wisdom-based environmental monographs on tribal and local wisdom values in the Probolinggo Regency using qualitative descriptive statistics. This research identifies the local tribal wisdom in the Probolinggo Regency. An analysis of the subjects' developmental targets was conducted. The analysis includes students' needs for contextual information with monographs, which is used in environmental learning. Researchers have completed questionnaires and conducted direct observations. Then, research data collection about local tribal wisdom in the Probolinggo Regency was carried out using observation and environmental data collection in the uplands, middlelands, and lowlands. This research was conducted from April 2022 to October 2023.

The research location for the needs analysis was the Geography Undergraduate Study Program, Faculty of Social Sciences, State University of Malang, the Bromo Tengger Semeru National Park Hall, and the Probolinggo Regency Regional Government. The research locations for concept analysis were in Ngadisari Village, Wonontoro Village, Jetak Village, and Ngadas Village, Sukapura District, Probolinggo Regency, for the Tengger Tribe in the upland environment. The research location is Javanese, with a middle-land environment in Negarareja Village, Lumbang District, and Probolinggo Regency. The research location was the Madurese tribe, which has a lowland environment in Gili Ketapang Village, Sumberasih District, and Probolinggo Regency. The research locations for concept analysis are shown in Figure 1.

The reason for choosing a research location in the communal upland area of the Tengger tribe was that the first four villages of Mount Bromo carried out traditional ceremonies and non-ceremonial traditional activities, while the fifth village no longer held traditional ceremonies. In the middleland and lowlands, the location of traditional adherents was partial, so they were spread out and researchers chose one place. Especially in the middle, the Mbah Sujud offering ceremony was held only in Nagarareja Village.

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Environmental geography lecturers, students, the BBTNBTS utilization section, and the Bakesbangpol Linmas services section of the Probolinggo Regency need to analyze the research subject. The research subjects in the concept analysis were deliberately selected key informants. Key informants were selected based on those who knew the ins and outs of culture, were directly involved as implementers, and participated in traditional ceremonies. In this case, the shaman was the person who led the traditional ceremony, the village government was the party that also carried out the traditional ceremony, and the community of traditional adherents participated in carrying out the traditional ceremony. The research subjects consisted of six shaman and traditional figure, eight village governments, and 16 local communities.

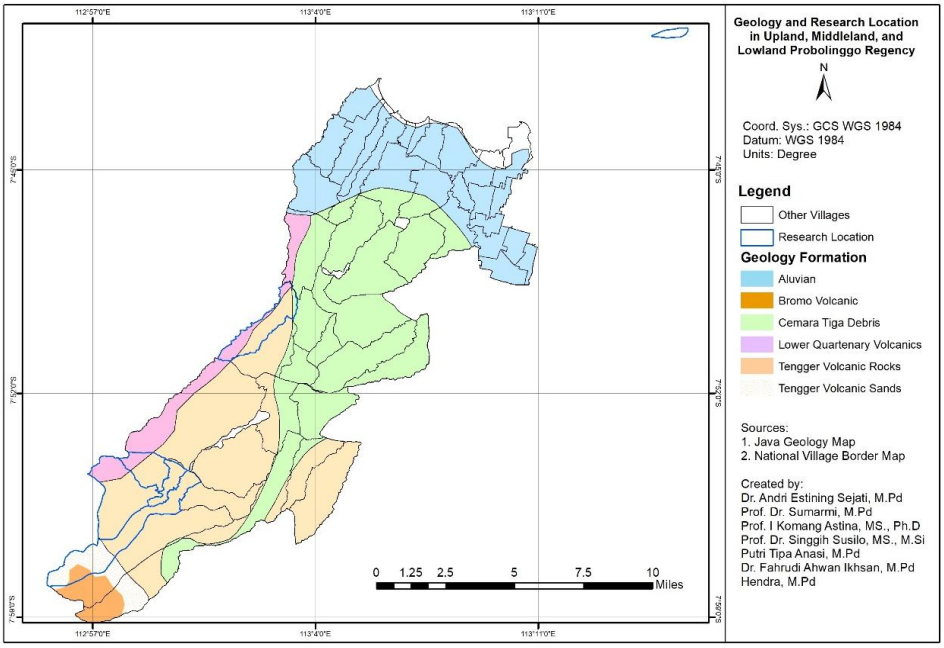


Figure 1. Geology and research location

Research data were obtained from observations, in-depth interviews, and documentation that illustrate the need to develop monographs and preserve the upland environment of the Tengger Tribe, the middleland environment of the Javanese Tribe, and the lowland environment of the Madurese Tribe within the scope of the Probolinggo Regency. The data analysis was qualitative, consist of domain, taxonomy, componential, and cultural themes, using information from qualitative data to analyze the needs and values of local tribal wisdom in the upland, middleland, and lowland areas of the Probolinggo Regency.

RESULTS AND DISCUSSION

Need Analysis

The development of an environmental monograph, based on the local wisdom of the Tengger Tribe, was based on several reviews. In a specific educational review, the lecture process in the Environmental Geography course of the Geography Undergraduate Study Program, Faculty of Social Sciences, State University of Malang still requires a monograph that discusses community environmental management. There were books on environmental management based on local wisdom, but not yet, with various tribes in three morphological units in one region. It needs to be developed to specifically discuss the relationship between traditional ceremonies related to the calendar, traditional ceremonies unrelated to the calendar, and non-traditional ceremonies. Research on local wisdom can be developed into contextual material (Andriana et al., 2017; Hartini et al., 2018). Lack of learning resources is the reason for the development of research (Suryani et al., 2021).

The Tengger, Javanese, and Madurese tribes in the Probolinggo Regency were based on the distance from Malang via the Poncokusumo route, Malang Regency (55 km), or Wonokitri

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route (64 km). This close local knowledge makes the material more familiar and easier for students to adapt. Contextual local wisdom allows students to gain a direct experience (Hartini et al., 2018). Contextual materials are more accessible to students (Amaluddin et al., 2019).

In the curriculum review, in this case, the Environmental Geography course of the Geography Undergraduate Study Program, FIS, UM, there is material related to local wisdom related to the environment. This material is often raised in the students' final assignments. Local wisdom is also a typical discussion that is always interesting to research (Abas et al., 2022). The development of materials for learning must focus on the applicable curriculum (Ensiyawatin et al., 2021; Ridhwan et al., 2019). Monographs can be used as a learning resource to review courses and curricula. Monographs have many benefits, one of which is that they are learning resources that students can use to study. Monographs do not act as teaching materials or supplements to teaching materials (Kuular, 2022). Monographs can be utilized by an open society so that the basis for development is not only a learning resource, but also by stakeholders who make it possible to utilize the monograph (Barnes, 2020).

A stakeholder review regarding the importance of the monograph was developed, first at the Bromo Tengger Semeru National Park Center (BBTNBTS), which had a vision to harmonize the environment with the Tengger culture. The second mission reveals the vision of harmonizing Tengger Culture and TNBTS management. This mission shows that the monograph on the upland part, which contains the Tengger Tribe, was needed directly by BBTNBTS to add matters related to the Tengger Tribe that were linked to its vision and mission. Through the utilization section, BBTNBTS wants to know the cultural activities and their meaning. They also wanted to understand the response of the Tengger tribe community regarding the existence of TNBTS. Meetings were held between BBTNBTS and the community, including the elements of tourism actors, the village government, and Paruman Shaman Panditha. National Park management requires the support of local communities to help with environmental monitoring (Ensiyawatin et al., 2021; Modeen, 2020).

The second stakeholder's interest is the Probolinggo Regency Government's vision, which contains environmentally sound diction. The vision was derived from the third mission, namely, sustainable resource management. This monograph, with a study of the sustainable environment in its management and utilization, provided essential information for the Probolinggo Regency Government about its vision and mission. Through the National Unity and Political Community Protection Agency, the Regency Government granted permission and requested research results for government study purposes. Government permission was essential for starting the research and obtaining documents before publication (Chief et al., 2016). The Sukapura District, Lumbang District, and Sumberasih District governments also fully supported the local wisdom at the research location. The village government also needs local wisdom texts as learning materials for their children. Local wisdom can be preserved by involving practice and conveying the meaning of implementation in various forms, including textual (Naves et al., 2019).

Concept Analysis

The concept of local wisdom related to the environment was found in the upland, middleland, and lowland Probolinggo Regency. In the upland, the Tengger tribe people had a way of life called *tigo weningan*, which means they have a good relationship with God, humans, and nature. Regarding relationships with nature, it was practiced when gardening vegetables and people preserved evergreen plants on garden embankments as garden borders. Many pine plants interspersed in plantations support the concept (Sumarmi, 2018).

When people need pinewood, they perform a small ceremony before cutting the trees they want to use. The traditional ceremony prepares the cutting of trees to be used as needed, such as in the frame of a house. People who want to cut trees come to *Paruman* Shaman *Panditha* to convey their wishes. *Paruman* Shaman *Panditha* casts a spell on a straightforward offering on a banana leaf. Offerings were placed near the tree to be felled prior to the felling process. The purpose of the traditional ceremony is to help trees without hurting beneficiaries.

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Before cutting, they also prepared replacement plants so that the pine was balanced. Before starting gardening, people communicate with the land in the form of permission to manage it. In this way, the land is treated as a living creature communicated with, and not managed at will. Respecting and coexisting with nature is a good moral for conservation and natural resource management efforts (Chunhabunyatip et al., 2018). Figure 2 shows the conditions of pine trees in the community plantations and gardening activities.



Figure 2. Pine as a marker for garden embankments and vegetable planting activities

Figure 2 in the left section shows pine trees as a border of the farming land in every corner. Figure 2 in the right section shows pine trees as a border of the farming land on the side. Other plants, such as amethyst trees, bamboo, and many flowers, were also allowed to grow, which adds to beauty. The Tengger tribe with *tigo weningan* has a mutually beneficial relationship with nature. Nature provides coolness, oxygen, beauty, and comfort when well treated. Harmonizing humans with nature benefits both parties; local wisdom makes nature sustainable (Modeen, 2020; Woodhouse et al., 2015).

Regarding water conservation, people view water sources as respected places or *Punden*. The location of the water source, even though there was no Punden building, the community considered it a noetic (invisible) *Punden*. The construction of a glass bridge was considered a place with many water sources, so the Tengger tribe preferred this area only as a water source, so that it remained sustainable. Local cultural water use has elements of caution and sustainability (Marlina et al., 2022). Figure 3 shows the location of the glass bridge, which contains many water sources.



Figure 3. Glass bridge project

Figure 3 in the left section shows the start of the glass bridge project. Figure 3, in the right section, shows the bottom of the glass bridge project water flow from the river and springs. Water is an essential element that people use for their daily needs. The use of water sparingly or non-exploitatively was an effort to preserve it. This effort can overcome extreme situations such as water needs during a long dry season. Respect for water is local wisdom that can preserve regional water resources (Camacho et al., 2016).

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The local wisdom of the Tengger tribe, reflected in environmental conservation practices, such as tree conservation, water resource management, and traditional land management, is relevant to global challenges related to climate change and sustainability. The Tenggerese approach to nature, such as the practice of cutting and planting, use of resources based on needs, and preservation of sacred sites, reflects the principles of sustainability that are in line with the 2030 Agenda for Sustainable Development, which emphasizes ecosystem protection, sustainable resource management, and biodiversity conservation (Ziaul & Shuwei, 2023). With the increasing pressure on natural resources due to modernization and urbanization, the traditional practices implemented by the Tenggerese are an essential example of global efforts to integrate local knowledge into climate change mitigation strategies and environmental management. Regarding traditional ceremonies, it was found that *Kasanga, Kasada*, and *Unan-Unan* had upland environmental preservation value. *Kasanga* cleans the environment before and after the traditional ceremonies. *Kasada* is grateful for being given abundant agricultural products. *Unan-Unan*, with its Sanggar, has typical tall and respected (Sejati et al., 2023).

The traditional *Pujan Kasanga* ceremony of the Tengger community is strongly relevant to several global issues and Sustainable Development Goals (SDGs). The SDGs are a priority in many countries initiated by the UN (Wirahayu et al., 2022; Wongkumchai & Kiattisin, 2021). In this series of ceremonies, the practice of cleaning the environment from waste, especially plastic, reflects a commitment to environmental conservation, in line with SDG 13 (Climate Action) and SDG 15 (Safeguarding Terrestrial Ecosystems). The spirit of cooperation in this activity strengthens Sustainable Cities and Communities (SDG 11) because it involves collaboration between the village government, *Shaman Panditha*, and the community in creating a clean and sustainable environment. The active involvement of the community, especially in preserving local traditions and values that focus on the balance of nature, also supports the achievement of SDG 4 (Quality Education), because it functions as an informal educational medium for the younger generation to understand the importance of harmonious interactions between humans and the environment. Pujan Kasanga is an effort to preserve local culture and contribute to the global agenda of achieving sustainable ecological and social well-being.

The *Pujan Kasada* ceremony involving the Tengger tribe community on Mount Bromo reflects the close relationship between culture, the environment, and sustainability, which is also relevant to global issues and the SDGs. The tradition of offering agricultural products and agroforestry management in this area contributes to SDG 2 (Zero Hunger) and SDG 15 (Life on Land) through agricultural practices that are in harmony with nature. The use of plastic in offerings and the remains of traditional ceremonies threatens environmental sustainability, in contrast to SDG 12 (Responsible Consumption and Production). Mitigation measures taken by local communities and authorities to reduce the impact of plastic can support the transition to more sustainable and environmentally friendly practices in line with the global goal of reducing pollution and protecting ecosystems (Ziaul & Shuwei, 2023).

The Tengger tribe's *Unan-Unan* traditional ceremony, which focuses on gratitude for nature and environmental sustainability, has strong relevance to current global issues, namely, climate change and sustainability. The symbolism of the buffalo as a form of hard work, perseverance, and respect for nature reflects the relationship between humans and their ecosystems, which also supports the importance of preserving natural resources and using biodegradable materials. Sanggar, which is maintained and equipped with large trees, is also a local example that supports forest conservation and mitigates global environmental impacts. This ceremony shows the importance of traditional practices that value sustainability and ecological responsibility in line with global efforts to maintain the balance of nature and combat the environmental crisis (Pyykkönen, 2024).

Local wisdom in Middleland is that Mbah Sujud's grave was in an area filled with trees or forest, covering an area of five hectares. This area was sustainable because people respected it and did not take branches or trees. The Javanese people use the Mbah Sujud grave area to offer monthly ceremonies on Friday *Legi*. Certain customs may not use forested areas for human

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needs (Chunhabunyatip et al., 2018; Martínez-Graña et al., 2022; Su et al., 2020; Sumarmi et al., 2020).

This 5-hectare forest area was under Perhutani ownership. However, people can also enter and exit. The Javanese people in Negororejo Village use wood and twigs for cooking. However, people do not dare to use wood or branches in the area of Mbah Sujud's grave. People believe that using twigs and wood from the area will bring bad luck. The sign that often appears when cutting is that it emits a red sap. Community trust is typically passed down from generation to generation and often favors the environment (Camacho et al., 2016; Chief et al., 2016; Oloriz & Parlee, 2020). Figure 4 shows the forest area where Mbah Sujud's grave was located.



Figure 4. Mbah Sujud grave forest area

Figure 4 in the left section shows the building used to cook the offering in Mbah Sujud's grave. Figure 4 in the right section shows the front of the Mbah Sujud's grave area with many plants. Regarding water conservation, the water source at the Madakaripura waterfall around the Gajah Mada statue has also been preserved. People do not use this source, but it is helpful as a flowing water reserve for agriculture during the dry season. Other water sources were used by the Village PDAM for daily needs at an IDR of 10,000 per month. Water can be used for many activities and is an essential resource for living organisms (Salampessy et al., 2021).

The local wisdom of the Negororejo Village community in preserving the Mbah Sujud tomb area has strong relevance to global issues related to environmental conservation and achieving the SDGs. The practice of respecting sacred forests and prohibiting the use of natural resources in sacred areas is in line with the SDGs, especially Goal 13 (Addressing Climate Change) and Goal 15 (Conserving Terrestrial Ecosystems). This tradition reflects the success of a community-based approach to maintaining an ecological balance that supports biodiversity and prevents environmental degradation. Local values promoting sustainable forest management also show that traditional wisdom can effectively address global environmental threats and strengthen global commitment to ecological sustainability and cultural protection (Turner et al., 2022).

Negororejo Village's approach to environmental conservation and sustainable natural resource management reflects a local response to global challenges, such as climate change, land degradation, and declining biodiversity. Practices such as reforestation, water management, and sustainable plantations align with the global agenda for climate change mitigation and nature conservation as advocated by the UN SDGs. The village's efforts demonstrate that local wisdom and community-based strategies can significantly achieve these global goals by maintaining an ecological balance while supporting local economies. This exemplifies how local solutions can contribute significantly to global environmental issues (Wongkumchai & Kiattisin, 2021).

Local wisdom in the lowlands was that fishing tools used natural materials called *onjem*. *Onjem* materials vary; some are made of bamboo, coconut leaves, and trees that grow on the island of Gili Ketapang. Using natural materials makes fishing more natural (Sumarmi et al., 2019). Figure 5 shows the assembly of *onjem* made of bamboo.

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Figure 5. *Onjem* assembly

Onjem in Figure 5 is composed of pyramid-shaped bamboo. People perform *Petik Laut* ceremonies to respect the sea as a place to earn a living. On Fridays, people also focus on land activities, meaning they have a holiday at sea. This rule shows that fish harvesting was not exploitative. Tribes and the environment are interrelated; tribes close to the marine environment in terms of work and home have more respect for the environment, as do the Bajo Tribe (Basri et al., 2017; Marlina et al., 2020).

The *Petik Laut* ceremony on Gili Ketapang Island, practiced by Madurese, exemplifies how traditional traditions can foster environmental sustainability and harmonious relationships between humans and nature. The ceremony involves constructing and decorating unique vessels with offerings and their subsequent release into the sea, reflecting a deep respect for the marine ecosystem and communal hopes for the abundant *Petik Laut*. Such practices are consistent with the broader understanding that indigenous communities often possess sophisticated knowledge and sustainable practices that benefit their members and the environment. The Madurese tradition of not fishing on Fridays to prevent overexploitation reflects the preferences for sustainable harvesting observed in other coastal communities, where attributes such as locality, freshness, and sustainability in seafood are highly valued (Martino, 2023). The ceremonial emphasis on community togetherness and respect for the ocean resonates with the finding that indigenous maritime traditions and cultural heritage play a critical role in maintaining ecological balance and supporting marine biodiversity (Perez-Alvaro, 2023; Simard et al., 2022). Madurese practices can be seen as part of a larger narrative in which local knowledge and cultural rituals contribute to sustainable marine resource management, such as Dominican diver fishermen, using color perception to navigate and interpret changes in the marine environment, highlighting broader systemic issues rather than local practices as the primary cause of ecological decline (Andrews, 2023). Integrating traditional activities with modern conservation efforts, such as successfully planting native macroalgae for coastal restoration, underscores the potential of combining indigenous knowledge with scientific approaches to enhance environmental conservation (François et al., 2023). The petik laut ceremony not only preserves cultural heritage but also plays a vital role in the sustainable management of the marine and coastal ecosystems of Gili Ketapang Island.

In terms of water conservation, people use wells to meet their daily needs. The wells were dug not deep, so that the water was not salty. Cat Cave had a reasonable revered that some people believed to be a well-of-soul mate. Purified water is usually found in sacred places such as caves (Marlina et al., 2022). Figure 6 shows the mate water well in the Cat Cave complex on Gili Ketapang Island. Figure 6 in the left section shows the matchmaking well in the cat-cave area. Figure 6 in the right section shows the matchmaking well in the cat cave area from close to close.

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Figure 6. Matchmaking well in Cat Cave

The practices of the Gili Ketapang Island community in conserving their marine and coastal environments reflect the deep integration of local wisdom and sustainable resource management aligned with blue economy principles. Their use of shallow wells to avoid saltwater intrusion, with some wells considered sacred, reflects the importance of cultural beliefs in environmental management. This is similar to the Endenese in Eastern Indonesia, who view food and seafood through a cosmological lens, impacting their dietary practices and health outcomes (Ramenzoni, 2023). The use of simple natural fishing gear by fishers and the implementation of free catch days for ecosystem restoration are similar to the community-led marine conservation efforts seen in Aceh Province, Indonesia, where traditional fisheries management systems such as *Panglima Laot* have been strengthened to sustainably manage marine resources (Church et al., 2023). The protection of coral reefs and sacred sites by limiting destructive activities resonates with the efforts of local champions on Selayar Island, who have developed unorthodox strategies to mobilize social change and protect ecosystem services despite the challenges posed by illegal fishing supply chains (Abdurrahim et al., 2022). The community's approach to managing environmental challenges such as litter and the stench of free-roaming goat herds highlights the need for adaptive strategies in the face of climate change and governance structures that often conflict with customary practices, as discussed by indigenous and traditional communities at the Future Seas 2030 workshop (Fischer et al., 2021). The emphasis on minimal environmental impact and economic equity in their practices aligns with the principles of community-based marine ecotourism in Sanniang Bay, China, a sustainable tourism venture designed to benefit local fishermen and minimize ecological footprints (Wu, 2024). These practices underscore the community's commitment to balancing livelihood needs with environmental conservation, thus demonstrating a holistic approach to sustainable marine resource use. Philosophically, content is included in the monograph and is used in education and other stakeholders. The object or site in the upland, middleland, and lowland has various spatial relations to the human who lives in that place. Spatial ethnography research can be used to analyze the relationship between spatial, human, and environmental factors (Low, 2016).

CONCLUSIONS AND SUGGESTIONS

There are two conclusions drawn from this study. First, the need for environmental monographs based on local wisdom in Probolinggo Regency was based on needs that were in line with environmental geography courses and curriculum at the Bachelor of Geography, State University of Malang, and the interests of stakeholders, in this case BBTNBTS, in managing TNBTS, paying attention to elements of Tengger culture and the Probolinggo Regency Government who wants monographs for one of the local wisdom sustainability materials. Second, the concept of local wisdom related to the environment exists in the uplands, middlelands, and lowlands. The concept of local wisdom in the upland was in the form of preserving land and water through agriculture with agroforests, *tigo weningan*, and water *punden*. Local wisdom in the middle land was in the form of forest and water conservation through the Mbah Sujud grave zone and was the source of the Madakaripura waterfall. Local

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wisdom in the lowlands was in the form of preserving the sea and water through environment-friendly fishing gear, implementing catch-free days, and using shallow dug wells. The significant academic implications of this research are that it bridges traditional ecological knowledge with education and stakeholder needs. The different sites have unique traditional practices in the context of ecology. Suggestions for further research development are to conduct in-depth studies on the use of local wisdom-based monographs in practical geography learning and their implementation in the field through the 4D development model.

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