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# Environmental Management Based (EMB) on Local Wisdom for Sustainable Utilization of Natural Resources in the Environmental Rescue Movement (ERM) in Villages, South Konawe, Indonesia

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**ABSTRACT:** This study uses a qualitative approach with a case study strategy in four villages in South Konawe Regency, Indonesia, to explore environmental management practices based on local wisdom with the Building Village Index (BVI) instrument, which includes social, economic, and environmental resilience dimensions. The study results show that local wisdom, such as traditional planting patterns, customary law, and water and natural resource management through traditional rituals, play a significant role in maintaining the balance of the village ecosystem while strengthening cultural identity. The integration of local wisdom with appropriate technology has been proven to increase ecological awareness, strengthen social solidarity, and support equitable distribution of resources, although improvements in waste and energy governance are still needed. Theoretically, these findings enrich the literature on village resilience based on local wisdom, while practically providing evidence-based policy recommendations to strengthen ecological conservation and sustainable village development.

**Keywords:** Environmental management based; Local wisdom; Sustainable; Natural resources; Environmental Rescue Movement



## 1. Introduction

The Environmental Rescue Movement (ERM) is closely related to Local Wisdom-Based Environmental Management (EMB), where ERM functions as a collective forum for village communities to preserve and rehabilitate the environment through environmentally friendly traditional practices that are in harmony with local culture. EMB is a conceptual foundation that leads to the integration of appropriate technology, education, and active community participation. This synergy strengthens the sustainability of the village ecosystem, ensures the fair use of natural resources, and ensures sustainability for future generations.

The movement to save the environment in villages is very important to maintain the balance of the ecosystem and the sustainability of natural resources. The assessment of ecosystem services in the Yangtze River Delta Integrated Green Demonstration Zone emphasizes the importance of saving the environment and balancing ecosystems for sustainable management of waterfront areas [1]. Energy efficiency in public buildings is important for saving the environment and ecosystem balance by utilizing ICT to optimize HVAC systems to save energy without sacrificing the comfort and health of residents [2]. The environmental movement focuses on the sustainability of natural resources by integrating environmental protection into national policies, although global challenges such as global warming and abnormal atmospheric phenomena remain [3]. Monitoring of spatial-temporal changes in aquaculture in Southeast Asia reveals a rapid initial expansion followed by a decline, with changing distribution patterns, supporting environmental movements, and natural resource sustainability [4]. The impact of migration on nature-community interactions, social disparities, and cultural adaptation in sustainability, suggests that migration can support environmental movements and natural resource sustainability [5].

Local wisdom-based environmental management plays a key role by utilizing traditional knowledge and practices that have proven effective in preserving nature. Environmental management and local community knowledge are

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important in developing sustainable ecotourism in Bur Telege through Qanun regulations and local community involvement [6]. Socio-ecological research in Nepal demonstrates the importance of local knowledge in environmental management to support community adaptation to changing dependence on forests and agroforestry [7]. Community service programs leverage traditional practices and sustainable environments to process inorganic waste into innovative blocks, reduce waste, and support sustainable community development [8]. The research investigates traditional Malay silverware crafts that have existed for two centuries, reflecting the culture and heritage of the community by leveraging sustainable practices linked to the environment [9]. The study evaluates the intensity of the development and utilization of the Liaoning coastal zone, taking into account its natural characteristics essential for integrated coastal zone management [10].

Respect the local culture and encourage the active participation of the community in conservation, as the village community has a strong emotional and social bond with the environment. Active community participation in nature conservation is the main key to sustainable local tourism development in Tapulaga Village [11]. Active community participation in conservation in Bangka Belitung shows the potential for integration of local laws to overcome the problem of illegal tin mining [12]. Good physical and social conditions influence strong emotional and social ties to the environment, especially in Guangzhou, China, where rapid changes in the market have changed the fundamentals of the urban environment [13]. Strong emotional and social connections on social media often provide informational and emotional support, contrasting with the common notion of the importance of weak bonds in encouraging participation [14]. Online games facilitate the development of social and emotional skills and form strong emotional bonds with the social environment [15].

Sustainable use of natural resources, such as organic agriculture and community-based forest management, can improve the economic well-being of villages. The pillars of natural resources, innovation, globalization, and green growth are intertwined, forming the basis for sustainable economic prosperity in the BRICS countries [16]. The research examines the economic landscape of Humbang Hasundutan Regency, North Sumatra, focusing on potential sectors to be developed for sustainable economic growth and community welfare [17]. The utilization of Africa's critical natural resources for sustainable manufacturing can improve global supply chain resilience and global economic well-being [18]. Study the spatial and temporal dynamics of agricultural land resource transformation in the Sino-Vietnam border area to advance sustainable development goals related to food security and economic well-being [19]. Although Algeria is rich in natural resources, increased labor productivity in the agricultural sector is key to promoting sustainable economic growth and better well-being [20]

Integrating environmental conservation with improving the quality of life of village communities. Project management in the implementation of social and environmental programs in the Russian Arctic Zone focuses on environmental preservation and provokes an improvement in the quality of life of the population [21]. Arsenic contamination of nature and human activities seriously impacts environmental quality and human health, requiring in-depth research to support efforts to preserve the environment and improve the global quality of life [22]. The development of sub-urbanization in northern Russia is closely related to economic and technological modernization for environmental preservation and improvement of the quality of life in the region [23]. The use of Aloe vera gel in conjunction with chitosan in the manufacture of food coatings shows significant improvements in the physicochemical, mechanical, and antioxidant properties of edible films, potentially maintaining the quality and shelf life of fresh products as well as supporting environmental sustainability [24]. Grassland management with aeration and control methods can maintain the natural state and improve environmental quality and economic sustainability [25]

However, reality shows that the lack of understanding and support of the local community hinders the movement to save the environment in the village. The significant increase in energy prices since 2021 has prompted a change in views on energy poverty in the Netherlands, suggesting that social housing and financial shortages are the main obstacles to public participation in the energy transition [26]. Judges who handle environmental cases are not oriented toward environmental protection and rescue, with the main obstacle being the ultra-petita principle [27]. The Community Service Program in Karangmalang Wetan Village aims to overcome obstacles in maintaining the environment to create a healthy and comfortable environment [28]. It is necessary to understand the obstacles to implementing customary law in Indonesia in the context of saving the environment, which is regulated by stronger positive laws [29]. The battery-assisted PV-FC green energy system is proposed as a solution for rural electrification in Pakistan, overcoming fuel logistics barriers and unstable diesel prices, and saving the environment with zero emissions [30].

Environmental management based on local wisdom has not been optimally implemented, especially the use of endemic plants and traditional water conservation methods. The KOTAKU program in Penataban Giri Village, Banyuwangi, has successfully built drainage and sanitation facilities, reflecting environmental management efforts

without local wisdom [31]. Environmental management using local wisdom, as seen in Banjarmasin, significantly reduces the use of plastic bags through regulations and persuasive approaches [32]. It is necessary to collect and preserve ethnopharmaceutical knowledge based on the use of endemic plants by the Tolaki-Mekongga tribe in their traditional medicine [33]. Angola has a high biodiversity, especially in the Leguminosae family, with many endemic species with local economic value, such as traditional medicine, animal feed, and food [34]. The combination of camera traps and passive acoustic monitoring to address the significant data shortage regarding the reproductive status and vocalization character of the White-winged Flufftail demonstrates the effectiveness of non-traditional methods in conservation [35].

Neglect of sustainable natural resource utilization practices leads to environmental degradation and biodiversity loss. The mineral processing industry is crucial in the extraction of natural resources, focusing on the circular economy to reduce environmental degradation and reuse waste into valuable assets [36]. Green finance plays an important role in improving rural economic resilience and environmental sustainability by supporting sustainable agricultural practices and reducing environmental degradation [37]. The watershed management strategy is integrated for sustainable resource utilization in the Kalte River watershed, which aims to reduce land degradation through best management practices such as terraces [38]. Ecological agriculture with an artificial intelligence approach supports the sustainability of natural resources, reducing biodiversity loss and environmental impact [39]. Climate change caused by human activities, the solar cycle, and the loss of biodiversity drives the need for sustainable natural resource practices to mitigate its impacts [40].

Limited infrastructure and resources can hinder effective conservation efforts. The implementation of environmental flows (e-flows) supports river conservation by overcoming infrastructure barriers and uneven and slow water resource management [41]. To explore the policies and physical infrastructure that support universal accessibility in the natural environment, which considers the challenge of balancing environmental conservation with environmental conservation [42]. Urban expansion along the Yellow River in Zhengzhou is causing ecosystem damage, with a green infrastructure network plan proposed to address environmental conservation barriers and ecosystem service needs [43]. Soil corrosiveness mapping helps identify the risk of damage to fence infrastructure, supporting environmental conservation by preventing invasive animal migration, such as in the Marna Banggara rewilding project on the Yorke Peninsula [44]. Increasing biodiversity through green infrastructure in vineyards in New Zealand's Waipara Valley, faces obstacles such as a lack of appreciation and knowledge from farmers and implementation and management costs [45].

There is not yet optimal synergy between the government, local communities, and non-governmental organizations to integrate local wisdom in sustainable environmental conservation programs in villages. That BIPVTGDPCM integrated with PCM addresses the lack of integration in environmental conservation with energy efficiency, $CO_2$ emission reduction, and long-term economic benefits in Rohtak, India [46]. Lack of integration in environmental conservation in the Ouricuri watershed leads to anoxic conditions at some points and high environmental risks, requiring immediate intervention to address pressures from sanitation systems and illegal construction [47]. The implementation of Total Quality Management TQM and Green Supply Chain Management GSCM in Pakistan's textile industry improves product quality, operational efficiency, and environmental conservation, despite the lack of integration in environmental conservation efforts [48]. Since independence in 1962, although Algeria's constitution and policies have increasingly emphasized environmental conservation, less effective integration has hindered real implementation in protecting nature from climate change [49]. The lack of integration in environmental preservation leads to the erosion of traditional village space due to urbanization, inhibits the adaptation and continuity of spatial texture, and loses the unique characteristics of traditional villages in Xiaoxi, Hunan [50].

The solution is that the movement to save the environment in the village can be carried out through environmental management based on local wisdom and sustainable use of natural resources. The revitalization of Maja Labo Dahu's local wisdom through strengthening social programs, customary institutions, and forest supervision is important to save the environment in Bima Regency [51]. The important role of local wisdom in the conservation of natural resources, combining environmental anthropology with traditional agricultural practices to maintain ecological harmony [52]. Sustainable development policy in Tiga Luhak encourages the preservation and utilization of local Minangkabau wisdom as an Indigenous cultural value and knowledge that supports the development of human resources [53]. The Mamar system in West Timor is a local wisdom policy for environmental conservation by utilizing natural resources in a sustainable manner according to the values and conditions of the local community [54]. Skills in managing natural resources in Simeulue, such as coconuts, reflect local wisdom. Still, the reluctance to renew coconut plantations due to respect for cultural heritage requires community awareness to ensure sustainable use of natural resources [55].

It involves the use of traditional practices that are environmentally friendly and maintain the sustainability of the village ecosystem. The introduction of climate-friendly agricultural technologies in villages to improve yields and food security, as well as traditional agricultural practices, can improve the sustainability of village ecosystems [56]. To

evaluate the sustainability of Mamar's traditional agroforestry in West Timor by analysing community livelihood assets, biophysical land performance, and ecosystem service value, it shows changes in management that interfere with the sustainability of village ecosystems [57]. Traditional rotational farming practices in Forest Villages in the Barak Valley, Assam, Northeast India, are undergoing a shift towards other agricultural systems, emphasizing the importance of ecosystem sustainability in its transition to diverse sources of livelihood [58]. Urbanization in the Hindu Kush Himalayan (HKH) region has a major impact on village ecosystems; Reliable data evaluation is needed to maintain ecosystem sustainability [59]. The construction of an ecological corridor for white cranes in Chongming Dongtan helps maintain the sustainability of the village ecosystem through the optimization of appropriate habitat patterns and strong ecological networks [60].

Maintaining the balance of nature and ensuring the sustainability of natural resources for future generations. The labour market is highly dependent on academic and vocational education and advanced training to address digitalisation and sustainability challenges, with education as a key factor to ensure national competitiveness and sustainable innovation [61]. The transition to clean and sustainable energy sources is important to ensure the future sustainability of natural resources and the environment [62]. Discuss efforts to improve the management of agricultural production through the wise use of available natural resources, to improve environmental sustainability in the long term [63]. Understanding the process of evolution is important to maintain the sustainability of natural resources for a sustainable future [64].

## 2. Literature Review

The Environmental Rescue Movement (ERM) in the village emphasizes the importance of environmental management based on local wisdom and the sustainable use of natural resources. The application of local cultural values in environmental management can create healthy, productive, and harmonious villages with the social system of the community. In this context, active community participation through education and training is a crucial factor to increase awareness, as the integration of Eco disaster risk reduction Eco-DRR and community-based CB-DRR through community empowerment, environmental conservation, and strengthening ecosystem resilience is a key strategy to deal with disaster vulnerability in mountainous areas in a sustainable manner [65]. The use of appropriate technology that is efficient, easy to apply, and environmentally friendly must be in line with the values of local wisdom to improve the welfare of the community without damaging culture and the ecosystem. The sustainability of natural resources needs to be maintained through fair and long-term oriented utilization rules, so that they can be passed on to future generations. Thus, the integration of traditional environmentally friendly practices, community participation, environmental education, and the application of appropriate technology is believed to be able to increase the sustainability of the village ecosystem while ensuring the fair and sustainable use of natural resources between generations.

## 3. Research Methods

This research method uses a qualitative approach with a case study strategy to explore environmental management practices based on local wisdom in four villages in South Konawe Regency, Indonesia. The research is based on the official instrument of the Ministry of Villages, Development of Disadvantaged Regions, and Transmigration of the Republic of Indonesia Number 2 of 2016 concerning the Building Village Index (BVI) which is formulated through three main dimensions, namely the Social Resilience Index (SRI), the Economic Resilience Index (ERI), and the Environmental Resilience Index (EnRI). Each dimension is built on indicators with a score of 0–5, then transformed into an index with a value of 0–1 to obtain a typology of village status (independent, advanced, developed, disadvantaged, and very disadvantaged). Technically, data collection is carried out through direct observation, in-depth interviews with community leaders, farmers, village officials, and local stakeholders, and analysis of documents, village archives, and relevant literature to maintain data integrity and reduce interpretation bias. In addition, surveys and focus group discussions (FGDs) were conducted to capture perceptions, knowledge levels, and community participation in culture-based conservation. Field data was processed simultaneously during observation and interview activities to strengthen validity, while thematic analysis was used to identify patterns, meanings, and relationships between traditional practices, technological innovations, and the sustainability of village ecosystems. The assessment of social, economic, and environmental resilience is the basis for the analysis in drawing conclusions, as each indicator score contributes directly to the results of the index. Thus, the results of the study not only reflect the status of village resilience objectively, but also relate it to local values as the foundation of conservation, so as to strengthen the synergy of indigenous peoples and conservationists and provide evidence-based policy recommendations for sustainable village

ecological management [66] and avoiding the negative impact of human activities on ecology, so sustainability must be achieved by studying traditional wisdom, such as the wisdom of the Onge tribe and the sacred forest of Khasi, which are in harmony with nature and maintain environmental balance [67].

## 4. Results and Discussion

### *4.1. Integration of Traditional Practices with Appropriate Technology*

The development of sustainable solutions for village ecosystems is essential for the long-term sustainability of rural people's welfare. Combining traditional practices proven effective over the years with appropriate technology can create a more efficient and environmentally friendly system. Local wisdom from traditional practices is maintained, while modern technology increases productivity and reduces environmental impact. This approach allows villages to maintain their cultural identity in the face of modern challenges such as climate change and urbanization, which ultimately improves the quality of life of the entire village community. And it specifically happens that eco-friendly practices promote sustainability; otherwise, they would not be "friendly". The same goes for "the right technology": right because it's environmentally friendly

The results of the study in Table 1 show that local wisdom has a strategic role in supporting traditional conservation practices that maintain the sustainability of environmental ecosystems. Through traditional planting patterns and shifting farming practices, communities are able to maintain soil fertility and prevent land degradation. Customary laws governing forest use and the enforcement of strict rules in tree felling contribute to the balance of forest ecosystems. Similarly, traditional rituals in hunting and fishing activities serve as a natural mechanism to maintain animal populations. In addition, wise water management supports the sustainability of water resources, while the use of medicinal plants and the principle of "mutual cooperation" strengthen social solidarity in preserving the environment. Thus, local wisdom is not only ecological, but also social, so that it effectively supports sustainable conservation. The results of the study show that local wisdom supports environmental sustainability through customary rules and "pamali" norms, this provides important insights for environmental conservation policies [68], The application of Sasi local wisdom has a positive impact on the sustainability of ecosystem services, supporting the economic, social, cultural, and ecological welfare of the local community [69]. Traditional agroforestry practices are defined as land use systems based on a combination of plants, trees, and livestock, observed in the Western Mediterranean region of Turkey with the Diagnosis and Design method, identifying various patterns of agroforestry production [70], in line with the definition of appropriate technology by Murphy et al. [71]. Technology is appropriate, maintaining economic, social, and environmental balance, and reducing global risks to social and natural relations [72], Supporting Community Environmental Sustainability [73], as a flexible tool for decision-makers in assessing investment projects to meet the needs of the community [74].

**Table 1.** Local Wisdom in Maintaining a Sustainable Environmental Ecosystem.

| No. | Types of Local Wisdom | Traditional Practices | Appropriate Technology | Sustainable Solutions | Information |
|---|---|---|---|---|---|
| 1. | Traditional planting patterns | Farm moves | Resting the land to make it fertile again | Maintaining fertility, preventing land degradation | Sustainable farming methods and shifting fields help maintain soil fertility and prevent land degradation |
| 2. | Customary law | Strict customary rules in forest use | Licensed tree felling | Forest ecosystem balance | Customary forests are an important part of life, maintaining the balance of forest ecosystems |
| 3. | Prohibition and customary ritual | Timings in Fishing and hunting | Giving animals time to breed | Maintaining animal populations | Preserving nature, giving time for animals to breed, keeping the population |
| 4. | Water management | Maintaining the cleanliness of water sources | Efficient use of water for irrigation and daily necessities | Keeping the water ecosystem pure and sustainable | Thoughtful water management system, without damaging the aquatic ecosystem, maintains sustainability |
| 5. | Utilization of medicinal plants | Picking up plants without damaging the habitat | Plants continue to grow and develop | Maintaining plant sustainability | Knowledgeable in its own right, taking in moderation without damaging its habitat, plants continue to grow and develop |

| | | | | | |
|---|---|---|---|---|---|
| 6. | Principle Gotong-royong | Local wisdom is upheld and practiced | Cleaning the village, taking care of the farmland | Shared responsibility for environmental sustainability | Mutual cooperation is highly upheld, working together in protecting the environment, creating a sense of belonging and shared responsibility for environmental sustainability |

Source: Observation, Interview and Focus Group Discussion.

### *4.2. Active Participation of Local Communities in Environmental Conservation*

Education and training based on local wisdom are very important to encourage active community participation in protecting the environment. People can more easily accept and apply environmentally friendly practices by utilising traditional knowledge and existing cultural values. This approach also increases a sense of belonging and responsibility for the surrounding environment and motivates involvement in nature conservation.

The results of the study in Table 2 show that education based on local wisdom and environmental conservation training are able to translate traditional wisdom values into real collective actions in preserving the environment. Through education, people gain a deep understanding of the importance of ecological values embedded in local culture, thus fostering a critical awareness of the responsibility to protect nature. Meanwhile, conservation training provides practical skills that encourage the application of sustainability principles in daily life, such as efficient and environmentally friendly management of natural resources. The integration of the two results in a collective awareness that not only strengthens the active participation of the community but also encourages the formation of social solidarity in protecting the ecosystem. Thus, local policies are successfully actualized into sustainable joint actions. This participation not only builds a collective understanding of environmental values but also encourages sustainable practices that result in positive impacts on the environment, local ecosystems, and biodiversity. This is in line with conservation programs that involve the active participation of local communities and community organizations for environmental sustainability, food security, economic development, and response to climate change [75], The impact of green tourism on communities emphasizes the importance of active participation of local communities in environmental conservation and sustainable tourism [76], accompanied by a collective understanding of environmental values and the sustainability of local ecosystems, in accordance with the role of the collective renewable energy prosumer movement in the transformation of energy systems and reveals tensions related to the sustainability of local ecosystems and community involvement in environmental values [77]. Sustainable management of natural resources requires innovative approaches to strengthen local knowledge and the participation of local actors for ecosystem sustainability [78]. By raising environmental awareness and empowering communities, this participation protects natural resources vital to life and future generations. Overall, the active participation of local communities in environmental conservation not only provides a deeper understanding of local ecosystems but also aims to ensure future environmental sustainability. and environmental awareness and participation in protecting natural resources, in accordance with research on environmental awareness and participation in protecting natural resources among coastal communities, improving welfare by using coastal natural resources wisely for human life and ecosystems [79].

**Table 2.** Active Participation of Local Communities in Environmental Conservation.

| No. | Active Participation | Benefits of Participation | Environmental Conservationism |
|---|---|---|---|
| 1. | Education Based on Local Wisdom | Understanding Environmental Values | Raising Environmental Awareness |
| 2. | Conservation Engineering Training | Encouraging Sustainable Practices | Empowering the Community |
| 3. | Building Collective Understanding | Positive Impact on the Environment, Local Ecosystems, and Biodiversity | Protecting Natural Resources Vital for Life and Future Generations |

Source: Observation, Interview and Focus Group Discussion.

### *4.3. Fair Use of Natural Resources*

Contribution to the sustainability of the ecosystem is very important to maintain the balance of nature and human life. Equitable use of natural resources means ensuring that everyone has equal access to them without damaging ecosystems. Doing so can protect natural habitats, reduce pollution, and prevent biodiversity loss. These contributions include individual and collective actions, such as the use of drinking water sources, the use of water for bathing and washing, and waste management. Through a fair and responsible approach, it has supported the welfare of current and

future generations, maintaining health so that the integrity of the ecosystem is maintained and its benefits are enjoyed in a sustainable manner.

The results of the study in Table 3 show that the use of natural resources in Epeesi, Ranowila, Asaria, and Bakutaru Villages is relatively evenly distributed with an almost balanced number of points, although there is a small variation in the availability of facilities. Each village has five drinking water source points, which affirms the existence of fair access to the basic needs of the community. The use of water for bathing and washing, and the existence of garbage disposal sites also show that environmental governance is considered even though the number of points is lower than that of drinking water sources. Bakutaru has an advantage in electricity flow with five points, indicating the difference in infrastructure distribution between villages. Overall, this distribution reflects the principle of fairness in the use of resources, although governance still needs to be improved in terms of waste management and equitable distribution of electrical energy. The use of natural resources and ecosystem sustainability emphasizes the integration of agroforestry ecosystem assets with the use of natural resources and efforts to improve ecosystem sustainability through thorough evaluation and optimization of the relationship between the quantity and quality of ecosystem assets [80], pay attention to social, economic, and ecological aspects, and avoid environmental impacts [81]. Ecosystem sustainability and good governance, in the context of ecosystem sustainability and good governance, climate-smart soil management can provide diverse ecosystem services, support sustainable food production, and maintain soil biodiversity [82]. Natural resources to support ecosystem sustainability, in accordance with ecotourism, is an important tool to increase environmental awareness by utilizing the wealth of natural resources to support ecosystem sustainability and provide greater economic and social benefits for the country [83]. In accordance with the use of natural resources, this greatly affects the loyalty attitude of visitors through cultural ecosystem services, such as education and a sense of place, which supports the sustainability of the ecosystem [84].

**Table 3.** Utilization of Natural Resources and Sustainability of Village Ecosystems in South Konawe Regency.

| No. | Village | Point Drinking Water Source | Point Water Utilization for Bathing and Washing | Point Landfill | Power Flow Point | Number of Points |
|---|---|---|---|---|---|---|
| 1. | Epeesi | 5 | 4 | 3 | 4 | 16 |
| 2. | Ranowila | 5 | 4 | 3 | 4 | 16 |
| 3. | Asaria | 5 | 4 | 3 | 4 | 16 |
| 4. | Bakutaru | 5 | 4 | 5 | 5 | 19 |
| | Number of Points | 20 | 16 | 14 | 17 | 67 |

Description: The number 5 is very good, 4 is good, 3 is fair/good, 2 is less good, 1 is poor, 0 is not available.

### *4.4. Guarantee of Sustainability for Future Generations*

Ensuring fairness and sustainability refers to efforts made to ensure that social and economic justice is achieved without sacrificing future needs. This concept is closely related to ensuring sustainability for future generations, where current actions not only meet current needs but also consider the long-term impact on the environment, natural resources and social well-being. It involves socially and ecologically responsible policies, practices, and decision-making to leave a good legacy for future generations. The sustainability of the village ecosystem/ecology consists of two main indicators: water, soil, air, and river pollution.

The analysis results in Table 4 show that the sustainability of ecosystems in four villages in South Konawe Regency has variations in pollution levels that reflect differences in environmental conditions and social capacity in natural resource management. Epeesi and Bakutaru Villages recorded high scores (9 and 10 points), indicating significant pressure from water, soil, and air pollution, while Asaria Village was relatively lower (5 points) indicating the potential for better management. Ecosystem sustainability is inseparable from the interaction of local cultures in protecting rivers and land, the active participation of the community in reducing waste, and transparent and responsive village governance. Through this collaboration, measurable results in the form of decreasing pollution levels are a tangible indicator of strengthening environmental and social sustainability. Excellent or quite good environmental conditions. ecosystem sustainability and good environmental conditions, in accordance with Good Agricultural Practices (GAP) determine the level of food production, sustainability of agricultural productivity, and good global environmental conditions, as well as pay attention to the need for more sustainable agricultural systems to maintain ecosystems [85], ecosystem sustainability for future generations, demands the importance of sustainability management in the maturity

model, from awareness to innovation, supporting ecosystems for future generations in the context of sustainable development [86], Safeguarding the freedom of future generations by taking into account the limited resources and environmental impact of the current generation's decisions [87]. Efforts to maintain or improve sustainability points in these villages are important to ensure that natural resources are maintained for future generations, considering that a healthy environment is the main foundation for human and other life survival. A healthy environment is the foundation of human survival, one of which is water, the source of life and the basis for the growth of all things. A healthy aquatic environment is the cornerstone of human survival, with aquatic plants as an important environmental cleanser [88]. By always conducting effective environmental monitoring, integrating social media data, remote sensing images, and other basic data, to ensure a healthy environment as the foundation of human survival [89].

**Table 4.** Analysis of Village Ecosystem Sustainability Indicators in South Konawe.

| No. | Village | Water, Soil, and Air Pollution Points | River Pollution Point | Number of Points |
|---|---|---|---|---|
| 1. | Epeesi | 5 | 4 | 9 |
| 2. | Ranowila | 5 | 5 | 10 |
| 3. | Asaria | 1 | 4 | 5 |
| 4. | Bakutaru | 5 | 5 | 10 |
| | Total | 16 | 18 | 34 |

Description: The number 5 is very good, 4 is good, 3 is fair/good, 2 is less good, 1 is poor, 0 is not available.

## 5. Conclusions

Based on the results of research and discussion, it can be concluded that local wisdom has a fundamental role in maintaining the sustainability of the village ecosystem, especially when integrated with environmentally friendly appropriate technology. Traditional planting patterns, customary laws, water management, and hunting and fishing practices regulated through traditional rituals have been proven to maintain the balance of nature while strengthening the cultural identity of rural communities. Local wisdom-based education and environmental conservation training increase ecological awareness, strengthen active community participation, and form social solidarity in preserving the environment. The use of natural resources in the research villages showed a relatively fair distribution, although it is still necessary to strengthen waste management and equitable distribution of electrical energy in order to achieve comprehensive ecological justice. Meanwhile, an analysis of water, soil, and air pollution levels in four villages revealed variations in environmental conditions, where the success of maintaining the cleanliness of rivers and soils is greatly influenced by governance, collective participation, and compliance with customary rules. These findings show that combining traditional practices, active community participation, and applying appropriate technologies not only maintains soil fertility, biodiversity, and ecosystem balance, but also strengthens the social solidarity and economic well-being of rural communities. Thus, the sustainability of the village ecosystem can be ensured through synergy between ecological, social, and cultural aspects, to be able to respond to modern challenges such as climate change, urbanization, and economic pressures, while ensuring the availability of fair natural resources for current and future generations.

## 6. Recommendations

Based on the research results, it is recommended that village governments, customary institutions, and communities strengthen synergy in maintaining ecosystem sustainability through strengthening education based on local wisdom, the application of environmentally friendly technology, and better waste management. It is necessary to equalize access to electrical energy, increase community capacity in conservation, and strengthen the role of customary law to enforce collective compliance. With this step, the ecological, social, and cultural sustainability of the village can be guaranteed in a fair and sustainable manner.

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## Author Contributions

Conceptualization: M.A.; Methodology: M.A., P., L.M.; Data collection: P., L.M.; Formal analysis: M.A., P.; Writing—original draft: M.A.; Writing—review and editing: M.A., P., L.M.; Supervision: M.A. All authors have read and approved the final manuscript.

## Ethics Statement

Not applicable.

## Informed Consent Statement

Informed consent was obtained from all participants prior to interviews, focus group discussions, and surveys. Participants were informed about the purpose of the study, the voluntary nature of their participation, and their right to withdraw at any time.

## Data Availability Statement

The primary data supporting the findings of this study are available from the corresponding author upon reasonable request.

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## Declaration of Competing Interest

The authors declare no conflicts of interest.

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