



An Environmental Ethics Perspective in Supervision Karst Management in Maros-Pangkep: Study Case the Roles of WALHI

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Abstract. Environmental institutions are key components that play a crucial role in overcoming environmental problems. WALHI is one of the environmental NGOs that is developing in South Sulawesi. As a province with abundant natural resources, environmental problems occur in several areas, one of which is in the Maros-Pangkep karst area. Several points in this karst area are mining areas as well as national park areas, so that in determining government policies, they focus too much on empowering natural resources without considering the principle of sustainability of natural resources. So this study aims to analyzing the role of WALHI in managing the Maros Pangkep Karst from an environmental ethics perspective. This study uses a qualitative case study approach to examine the role of WALHI, a leading environmental non-governmental organization in Indonesia, in overseeing the management of the Maros Pangkep karst area. The findings of this study highlight the substantial impact of WALHI's efforts in raising awareness of the importance of preserving the Maros Pangkep Karst among the community and government. The findings of this study indicate that although regulations have been established, supervision and law enforcement in the field are still weak. Many karst management regulations are not enforced properly due to limited resources or corruption, leading to ongoing damage to the karst ecosystem and threatening this vital natural resource. This research aims to improve future management policies and practices. By addressing the challenges and developing better strategies, we can help preserve the Maros Pangkep Karst and other karst areas for future generations. The findings may also serve as a model for other karst regions in Indonesia and Southeast Asia, supporting global environmental conservation efforts.

Keywords: Environmental Ethics, WALHI, Karst Management, Environmental Policy

1 Introduction

An increasing number of studies on environmental ethics have highlighted the importance of promoting sustainable environmental management practices to address environmental crises. This shared concern has inspired the development of various approaches that consider the diverse interests and needs of those affected by environmental decisions, including a stakeholder-based framework that brings together different stakeholders to collaboratively manage natural resources .

Environmental organizations are key components that play a crucial role in overcoming environmental problems. Various studies have investigated the role of environmental organizations in environmental management. This study shows that environmental organizations play an important role in promoting environmental awareness and instilling environmental management attitudes in the community. Key findings from previous studies emphasize the importance of involving community participation in environmental management, and the need to develop an integrated environmental management model that considers formal and informal mechanisms to address environmental challenges.

In Indonesia, environmental ethics research has grown in recent years, especially in natural resource management. This study emphasizes the complex relationships between different stakeholders, institutions, and environmental results, stressing the need for a more holistic approach that goes beyond traditional top-down methods. Despite the growth of environmental ethics research, it is still rarely applied to assess the role of environmental organizations in managing natural resources.

The study of karst ecology and natural resource management has grown rapidly in recent decades, focusing on the complexity of the geomorphology, ecological functions, and management challenges. The work [1] in "*Karst Hydrogeology and Geomorphology*" discusses in depth the hydrogeological system and geomorphology of karst. They claimed that karst areas formed through the process of melting carbonate rocks have unique structures that support complex ecological systems. Ford and Williams noted that a lack of understanding of these processes often leads to poor management, overlooking the role of karsts in regulating water flow and storing carbon. As a result, improper land use and unsustainable resource exploitation in karst areas can cause significant environmental damage. This study also highlights the strong connection between karsts and climate, stressing their vital role in water and carbon storage, and how their destruction can worsen climate change. Additionally, the study points out that karst landscapes in Southeast Asia are especially vulnerable to human activities, such as mining, excavation, and urbanization, which threaten their unique biodiversity.

Similarly, a study by [2] on "Southeast Asian Limestone Karst: An Ark of Threatened Biodiversity", addresses the ecological significance of karst ecosystems in the region. The authors emphasized that the karst landscape in Southeast Asia hosts many endemic and threatened species, making it a global biodiversity hotspot. Human activities, such as mining, logging, and improper tourism development, pose a severe threat to fragile karst ecosystems. Some studies have demonstrated how humans interact with nature.

[3] in "*Karst Environment*" underlines the importance of integration between conservation and sustainable development in karst management. This conclusion leads us to understand that karst in Southeast Asia is often highly fragmented and has become an "island within an island", highlighting the need for a more holistic and strategic approach to its protection and management [2].

As one of the largest karsting regions in the world, the Maros Pangkep Karst region in

South Sulawesi, Indonesia, has gained widespread attention and recognition because of its ecological complexity and significance, making it a frequent subject of research. The Maros Pangkep Karst Area, located in South Sulawesi, Indonesia, is known for its diverse landscape, rich biodiversity, and importance as a reservoir. The karst landscape in Maros Pangkep is famous not only for its aesthetic beauty, but also for its incredible biodiversity.

In this study, we argue that the management of the Maros Pangkep Karst area is a complex effort because of the diverse stakeholders involved, each with their own interests and priorities, as well as the inherent fragmentation of the landscape. From this perspective, we need to find ways to engage these stakeholders and align their interests with the common goal of sustainable management of this important ecosystem. This is important to be a significant concern due to the increasing pressure on these fragile ecosystems from various human activities, such as mining, tourism, and agriculture. The involvement of local communities, as well as the involvement of non-governmental organizations, has been an important aspect of the discussion around the management of these areas. Environmental organizations such as the WALHI can bridge the gap between communities and governments in managing this complex ecological system.

As one of the leading environmental NGOs in Indonesia, the WALHI has played an important role in advocating for proper management and protection in the Maros Pangkep Karst area since the 1990s. Because of their involvement in the management and conservation of karst areas, they have been able to effectively monitor and report on issues affecting karst. In addition, the WALHI has been instrumental in encouraging the adoption of more sustainable practices in the region, such as the adoption of renewable energy sources and the use of environmentally friendly construction materials.

Given the importance of WALHI's role in overseeing the management of the Maros Pangkep Karst Area, this study explored the role of WALHI in supervising the management of Maros Pangkep Karst, especially from the perspective of environmental ethics. Through the lens of environmental ethics, this study examines the moral relationship between humans and the natural environment and provides a framework for understanding the ethical obligations and responsibilities of humans towards the environment. The lack of studies on karst areas from the perspective of environmental ethics provides an opportunity to expand knowledge about the importance of environmental ethics in karst management. The theoretical gaps in research related to this theme provide an opportunity to offer new insights into the role of environmental NGOs in karst management, particularly from the perspective of environmental ethics. By exploring the role of WALHI in supervising the management of Maros Pangkep Karst through the lens of environmental ethics, this research contributes to the existing literature on karst management and the importance of environmental ethics in natural resource management.

2 Methodology

This study used a qualitative case study approach to explore the role of the WALHI, a leading environmental non-governmental organization in Indonesia, in overseeing the management of the Maros Pangkep karst area. This study focuses on the application of environmental ethics principles in the WALHI's monitoring and advocacy efforts. Primary data collection methods included in-depth interviews with WALHI officials, government representatives, and local community members as well as a thorough review of policy documents, reports, and other relevant secondary sources. This comprehensive approach aims to provide a deeper understanding of WALHI's role of the WALHI in promoting sustainable and environmentally responsible management of the Maros Pangkep karst, a highly valuable and fragile ecosystem in South Sulawesi, Indonesia.

The data analysis process involved in-depth thematic analysis to identify and explore key themes, patterns, and insights that emerged from examining WALHI's role in monitoring and advocating for the management of the Maros Pangkep karst area. This comprehensive analysis will investigate the specific challenges and obstacles faced by the WALHI in its efforts to promote sustainable and environmentally responsible practices, as well as how the organization has sought to apply environmental ethical principles to guide and shape its approach to the management of this fragile and invaluable ecosystem.

3 Results and Discussion

3.1 Results

Raising Public and Government Awareness

One of the primary findings of this study is the significant role of the WALHI in enhancing public and governmental awareness regarding the importance of preserving Maros Pangkep Karst. Interviews conducted with various stakeholders, including WALHI members, government officials, and local communities, indicated that WALHI's environmental advocacy and education campaigns have effectively altered the perspectives and behaviors of numerous individuals and institutions. For instance, the WALHI initiative to organize seminars, workshops, and training sessions on the significance of karst in ecosystems and communities has produced favorable outcomes. Many participants acknowledged an improved understanding of the role of karst ecosystems in providing potable water, mitigating flood risks, and serving as habitats for diverse endemic species following their participation in these activities.

At the governmental level, the WALHI has effectively influenced policy through constructive dialogue and the provision of accurate scientific data regarding karst conditions and their associated impacts. As a result, several local policies have been implemented to support sustainable karst management. For instance, the local governments of Maros and Pangkep have enacted regulations that restrict mining activities and govern the utilization of land surrounding karst areas to mitigate adverse

environmental effects[4].

The study's findings highlight the substantial impact of WALHI's efforts in raising awareness about the importance of preserving Maros Pangkep Karst among both the public and government entities. Through a series of targeted initiatives, including seminars, workshops, and training sessions, WALHI has successfully educated various stakeholders on the critical role of karst ecosystems. These educational campaigns have led to a deeper understanding of how karst systems contribute to essential ecological functions, such as providing clean water, reducing flood risks, and supporting biodiversity by serving as habitats for endemic species. The effectiveness of these programs is evident in the altered perspectives and behaviors reported by participants, who now demonstrate a greater appreciation for the value of karst preservation.

At the policy level, WALHI's approach of engaging in constructive dialogue with government officials and presenting scientifically accurate data on karst conditions has yielded tangible results. This strategy has influenced the development and implementation of local policies aimed at sustainable karst management. Notably, the local governments of Maros and Pangkep have responded by enacting regulations that place restrictions on mining activities and govern land use in areas surrounding karst formations. These policy changes represent a significant step towards mitigating the adverse environmental impacts associated with human activities in karst regions, demonstrating the far-reaching effects of WALHI's advocacy work in shaping both public opinion and governmental action to protect these valuable ecosystems.

Challenges of Policy Implementation

Despite progress in policy formulation, the implementation of these policies has been hampered by various factors. One of the main obstacles is the existence of strong economic interests, especially in the mining and cement industries, which view karst areas as economic resources that can be exploited. These companies often have significant political and economic influence, which can hinder strict regulatory enforcement. This can be seen in cases where mining permits are issued, even though they are contrary to existing conservation regulations, on the grounds that they make a significant economic contribution to the region.

The lack of law enforcement is a serious problem. The findings of this study show that although regulations [5] have been established, supervision and law enforcement in the field are still weak. Many violations of karst management regulations [6] are not followed up firmly, either because of limited supervisory resources or corruption. This has resulted in the continued destruction of karst ecosystems, threatening the sustainability of this important natural resource.

The lack of effective law enforcement in karst management presents a multifaceted challenge that extends beyond the mere existence of regulations. While legal frameworks have been put in place to protect these fragile ecosystems, the study reveals a significant gap between policy and practice. The weak supervision and inadequate enforcement in the field have created an environment where violations of karst

management regulations often go unchecked. This situation is exacerbated by two primary factors: the scarcity of supervisory resources and the pervasive issue of corruption. As a result, those tasked with upholding these regulations may lack the necessary means to monitor and address infractions effectively, or worse, may be compromised by corrupt practices that undermine the very purpose of the regulations.

The consequences of this enforcement deficit are far-reaching and potentially devastating for karst ecosystems. The continued destruction of these unique landscapes, despite the existence of protective measures, highlights the critical importance of robust implementation and enforcement mechanisms. Karst formations, known for their distinctive geological features and rich biodiversity, play a vital role in water resources, carbon sequestration, and biodiversity conservation. The ongoing degradation of these ecosystems not only threatens the immediate natural environment but also poses long-term risks to water security, climate stability, and ecological balance. Without significant improvements in law enforcement and a concerted effort to address the root causes of non-compliance, the sustainability of karst ecosystems remains in jeopardy, potentially leading to irreversible damage to this invaluable natural resource.

The Role of Environmental Ethics in Karst Management Policy

Environmental ethics serves as a crucial foundation for the formulation and implementation of karst management policies [7]. During interviews, WALHI members emphasized the significance of incorporating environmental ethical values, such as environmental justice and intergenerational responsibility, into every proposed policy. WALHI advocates for an approach that not only considers the economic aspect but also acknowledges the intrinsic value of nature and the rights of local communities. Policy analysis reveals that despite efforts to include environmental ethics in regulations, practices in the field often deviate from these principles. For instance, in the case of infrastructure development in proximity to karst areas, environmental impact assessments (EIAs) are frequently regarded as a mere formality without substantive action to mitigate negative environmental impacts. This situation underscores the necessity for a more robust framework and enhanced commitment from all stakeholders involved.

Environmental ethics plays a pivotal role in shaping karst management policies, as emphasized by WALHI members during interviews. These policies are expected to incorporate fundamental ethical values, including environmental justice and intergenerational responsibility, to ensure a comprehensive approach to karst conservation. WALHI's advocacy extends beyond mere economic considerations, emphasizing the intrinsic value of nature and the rights of local communities. This approach aims to create a more balanced and sustainable framework for karst management that respects both ecological integrity and human needs.

However, the implementation of these ethical principles in practice often falls short of the ideals set forth in regulations. Policy analysis reveals a significant discrepancy between the theoretical inclusion of environmental ethics in policy documents and their practical application in the field. A prime example of this discrepancy is evident in

infrastructure development projects near karst areas, where environmental impact assessments (EIAs) are frequently treated as perfunctory exercises rather than substantive tools for environmental protection. This disconnect between policy and practice underscores the urgent need for a more robust regulatory framework and a renewed commitment from all stakeholders involved in karst management. To bridge this gap, it is essential to develop mechanisms that ensure the effective translation of environmental ethical principles into concrete actions, fostering a more responsible and sustainable approach to karst ecosystem conservation.

3.2 Discussion

The results of this study revealed that the Indonesian Environmental Forum (WALHI) plays a crucial role in the supervision and management of Maros Pangkep Karst. WALHI is engaged in a diverse range of activities, including policy advocacy, environmental monitoring, and community education[8]. The efficacy of WALHI in raising awareness about the significance of karst conservation demonstrates the effectiveness of an environmental ethics-based advocacy approach.

In the context of political science, the role of WALHI can be analyzed through the lens of environmental political theory. This study indicates that WALHI functions as an intermediary between economic interests and environmental protection, attempting to balance these two considerations in karst management policies. This aligns with the theory of community participation in environmental politics, which emphasizes the importance of various actors' involvement in the policy-making process to achieve sustainability [9].

The study also revealed that although the WALHI succeeded in raising awareness, policy implementation is often hampered by short-term economic interests and a lack of law enforcement. These findings reflect the theory of conflict in environmental politics, which states that conflicts between economic and environmental interests often hinder the success of conservation policies [10]. As a non-state actor, the WALHI often faces challenges in influencing decisions taken by governments and the private sector.

This study compared the findings with the existing literature, corroborating several key findings of previous studies. [1] emphasized the complexity of karst ecosystem management, which is more comprehensively understood within the context of a holistic approach. These findings align with the results of the study, which indicate that the WALHI encounters challenges in formulating and implementing policies that consider all aspects of karst ecosystems. Ford and Williams proposed the necessity for a more integrated approach to karst management, which was further substantiated by WALHI's experience with Maros Pangkep Karst.

Emphasized the importance of integrating conservation and sustainable development [3]. This research supports their view by showing that WALHI seeks to integrate these two aspects in policy but faces significant obstacles from economic and political interests. This study shows that, although the WALHI is active in advocacy, the realization of ideal policies is often limited by conflicts of interest.

Demonstrate that NGOs play a significant role in natural resource management through active participation [11]. These findings align with research indicating that WALHI involvement can not only enhance awareness and management effectiveness but also identify limitations in effective policy implementation. This research corroborates the perspective that NGOs have the potential to influence policy; however, the outcomes are frequently affected by complex external factors.

The results of this study have several important implications for karst management policy. *First*, there is an urgent need to develop comprehensive and inclusive policies. Effective policies must integrate the economic and environmental aspects by considering the long-term interests of karst ecosystems. This includes the creation of a robust legal framework that can address conflicts of interest and support sustainable policy implementation. *Second*, this study shows that law enforcement must be strengthened. More effective and transparent enforcement mechanisms can reduce the violations of conservation policies and increase accountability. Strong law enforcement ensures that existing policies can be applied consistently and effectively. *Lastly*, it is crucial to enhance the involvement of WALHI and similar non-governmental organizations in policy development and oversight. Providing increased support through resources and information access can boost their ability to shape policies and ensure sustainable karst management practices. By actively including NGOs in consultations and policy formulation, the decision-making process can benefit from a more comprehensive and diverse perspective.

Several constraints should be taken into account when considering this study. Primarily, the research employed a case study methodology, which may not fully encompass the diversity of karst regions throughout Indonesia. *First*, the applicability and relevance of this study's findings to other locations could be influenced by differences in regional circumstances, regulatory frameworks, and administrative approaches across various karst areas. *Second*, The data collected through in-depth interviews and field observations may have been influenced by subjective biases from the respondents or researchers. Individual perceptions and subjective experiences can influence research outcomes and reduce data objectivity. *Third*, this study did not explore in depth the economic aspects of karst management, which can affect policy effectiveness. A more detailed economic analysis is needed to understand how the economic value of karst resources relates to the implemented management practices and policies.

To overcome these limitations and expand our understanding of karst management, several future research areas need to be considered. *First*, comparative research between various karst areas in Indonesia and Southeast Asia can provide broader insights into the challenges and solutions to karst management. These studies can help to identify the best practices and strategies that work in other locations.

Second, further research on the economic impact of karst management policies will provide a better understanding of the relationship between conservation and economic benefits. This includes an analysis of the economic impact of conservation policies and how economic value can be integrated in management planning.

Third, the exploration of success models in NGO advocacy and policy implementation in other contexts can provide valuable lessons to improve the effectiveness of WALHI and other NGOs. This research can help in formulating more effective strategies to influence environmental management policies and practices.

Fourth, the development of new methods for assessing and monitoring karst ecosystems will help in understanding environmental dynamics and the impacts of human activities and implemented policies. This research can improve the ability to measure and monitor the health of karst ecosystems more accurately.

By continuing research in this area, it can be expected that karst management strategies and policies can be improved, providing greater benefits for the conservation and sustainability of karst ecosystems in the future.

4 Conclusion

This study reveals several important findings regarding the role of the Indonesian Environment Forum (WALHI) in the supervision and management of the Maros Pangkep Karst from the perspective of environmental ethics:

WALHI's Role in Karst Management: WALHI has played a crucial role in raising awareness and advocacy for the preservation of the Maros Pangkep Karst. They have been involved in various activities such as environmental monitoring, community involvement, and policy advocacy to ensure sustainable management of karst areas. These efforts include the creation of environmental reports, participation in the policy-making process, and the organization of environmental awareness campaigns. These activities contribute to the development of local policies that better support sustainable karst management.

Policy Implementation Challenges: Although WALHI has been successful in advocacy and education, the implementation of karst management policies often encounters obstacles. Key obstacles include conflicts between short-term economic interests and environmental conservation needs, lack of law enforcement, and limited political support. Limestone mining and land conversion for agriculture or infrastructure development are major challenges, often outweighing conservation efforts.

The Need for a Strong Legal Framework: More effective law enforcement and a firmer policy framework are needed to support sustainable karst management. Existing policies are often not implemented consistently or not sufficiently decisively in addressing violations, resulting in further environmental damage.

Significance of NGO Engagement: The involvement of NGOs such as WALHI has proven to be crucial in natural resource management. NGOs play an important role in policy advocacy, monitoring, and community engagement. Nonetheless, further support from governments and other stakeholders is needed to strengthen their capacity and ensure conservation success.

Based on the results of the research, some policy recommendations to improve the management of the Maros Pangkep Karst and support the role of WALHI are as follows:

1. **Strengthening the Legal Framework and Law Enforcement:** The government needs to strengthen and enforce the legal framework for karst management by ensuring that conservation policies are implemented consistently. This involves stricter supervision of potentially environmentally damaging activities, as well as effective law enforcement against violations.
2. **Economic and Environmental Integration in Policy:** Management policies must integrate economic and environmental considerations in a balanced manner. This includes developing incentives for environmentally friendly practices and assessing the economic impact of activities that can damage karst ecosystems. Policies that are in favor of sustainability must be a priority in planning and implementation.
3. **Support for NGOs and Community Engagement:** Governments and the private sector should provide greater support to NGOs like WALHI in the form of resources, training, and access to information. The involvement of local communities should also be encouraged more intensively, by involving them in decision-making processes and environmental monitoring. A participatory approach can improve the effectiveness of policies and ensure that policies reflect the needs of local communities.
4. **Development and Implementation of Evidence-Based Policies:** Karst management policies should be based on strong scientific data and evidence. Further research on the environmental and economic impacts of various policies can help in formulating better strategies. Systematic data collection and continuous monitoring can provide the information needed for more effective policymaking.
5. **Raising Awareness and Education:** Community education and counseling programs should be strengthened to raise awareness about the importance of karst conservation and the impact of human activities. Effective education can help shape a more environmentally responsible attitude and support conservation efforts.

This research highlights the importance of WALHI's role in the supervision and management of the Maros Pangkep Karst, as well as the application of environmental ethical principles in conservation practices. WALHI has been successful in raising awareness and advocacy of policies, but significant challenges remain, especially in terms of policy implementation and law enforcement.

To achieve sustainable and effective management, a more comprehensive and integrated approach is needed. This involves closer cooperation between the government, communities, NGOs, and the private sector. Better policies, support for NGOs, and increased community engagement are important steps to ensure that karst ecosystems can be managed properly and provide long-term benefits for the environment and society.

This research is expected to provide a solid basis for future improvement of management policies and practices. By understanding and addressing the challenges,

as well as developing more effective strategies, we can ensure that the Maros Pangkep Karst and other karst areas can be preserved for future generations. It can also provide models that can be applied in other karst regions in Indonesia and Southeast Asia, strengthening global efforts in environmental conservation and natural resource management.

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