POLIKRASI
Journal Of Politics and Democracy

**Polikrasi: Journal of Politics and Democracy, Volume 3 Nomor 2, 2024, Halaman 80-90**
**https://idereach.com/Journal/index.php/polikrasi**

# Analysis of the Implementation of Marine Environmental Management to Support Village SDGs: Case Study in Kalibaru Village, North Jakarta

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**INFO ARTIKEL**

***Info Publikasi:***
*Research Article*

**Dikirim: 20 Januari 2024;**
**Diterima: 20 Maret 2024;**
**Dipublikasi: 30 Maret 2024;**



***How to cite:***
Hakim, M. L., & Hanif, N. A. (2024). Analysis of the Implementation of Marine Environmental Management to Support Village SDGs: Case Study in Kalibaru Village, North Jakarta. *Journal of Politics and Democracy, 3(2), 80-80*

**ABSTRAK**

Penelitian ini bertujuan menganalisis penerapan pengelolaan lingkungan laut di Kelurahan Kalibaru serta kontribusinya terhadap pencapaian Tujuan Pembangunan Berkelanjutan (SDGs), khususnya tujuan ke-14 tentang kelestarian ekosistem laut. Fokus penelitian mencakup evaluasi kebijakan lokal dan identifikasi tantangan utama, antara lain keterbatasan pendanaan, kapasitas teknis, rendahnya kesadaran masyarakat, serta minimnya dukungan teknologi. Metode penelitian yang digunakan adalah kualitatif dengan pendekatan studi kasus. Data primer diperoleh melalui wawancara dengan perangkat desa, pemerintah kecamatan, nelayan, dan tokoh masyarakat, serta observasi lapangan mengenai kondisi lingkungan laut. Analisis data dilakukan dengan teknik pengkodean tematik untuk menemukan pola-pola penting dalam praktik pengelolaan lingkungan. Hasil penelitian menunjukkan bahwa meskipun terdapat kebijakan pengelolaan limbah dan regulasi perikanan, implementasi di lapangan masih lemah. Tingginya polusi laut akibat limbah plastik dan industri, ditambah rendahnya kesadaran masyarakat, membuat kondisi perairan tetap memprihatinkan. Namun, terdapat perkembangan positif berupa meningkatnya kesadaran lingkungan, koordinasi antar pemangku kepentingan, dan stabilnya stok ikan yang berdampak pada perbaikan ekonomi nelayan. Kesimpulannya, pengelolaan lingkungan laut di Kelurahan Kalibaru menunjukkan kemajuan meski masih terbatas. Penguatan regulasi, peningkatan kapasitas teknis, serta dukungan pendanaan dan teknologi berkelanjutan sangat diperlukan agar

pengelolaan menjadi lebih efektif dan berkontribusi nyata terhadap pencapaian SDGs Desa.

*This study aims to analyze the implementation of marine environmental management in Kalibaru Village and its contribution to the achievement of the Sustainable Development Goals (SDGs), particularly Goal 14 on the conservation of marine ecosystems. The research focuses on evaluating local policies and identifying key challenges, including limited funding, technical capacity, low community awareness, and inadequate technological support. The study employed a qualitative method with a case study approach. Primary data were collected through interviews with village officials, sub-district government representatives, fishermen, and community leaders, as well as field observations of the local marine environment. Data were analyzed using thematic coding techniques to identify significant patterns in management practices. The findings reveal that although policies such as waste management and fisheries regulation exist, their implementation remains weak. High levels of marine pollution from plastic and industrial waste, coupled with low public awareness, have resulted in poor environmental conditions. Nevertheless, there has been progress in increasing environmental awareness, improving stakeholder coordination, and stabilizing fish stocks, which has positively impacted fishermen's livelihoods. In conclusion, marine environmental management in Kalibaru Village has shown some progress but remains limited. Strengthening regulations, enhancing technical capacity, and providing sustainable funding and technology are essential to make management more effective and contribute significantly to the achievement of the Village SDGs.*

***Keywords:*** *Ekosistem Laut, Kelurahan Kalibaru, Pengelolaan Lingkungan Laut, SDGs*

## 1. Pendahuluan

Marine environmental management is a crucial aspect in maintaining ecosystem balance, not only for the sustainability of marine life but also for human welfare, particularly coastal communities that rely heavily on marine resources(Iskandar, 2020). The ocean provides various critical ecological, economic, and social benefits(Gissi et al., 2022). A healthy marine ecosystem can support biodiversity, protect coastlines from erosion, and provide food sources and livelihoods for millions of people(Xue et al., 2023). On the other hand, the degradation of the marine environment due to human activities, such as overfishing, plastic pollution, and climate change, has caused significant damage to this ecosystem, impacting food security and the economy of coastal communities(Hakim, 2023).

Effective and sustainable management is key to minimizing these negative impacts(Inayah et al., 2023). Efforts to protect and sustainably utilize marine resources require the participation of

various stakeholders, including governments, local communities, non-governmental organizations, and the private sector(Chen & Yen, 2023). Globally, the Sustainable Development Goals (SDGs), established by the United Nations in 2015, emphasize the importance of preserving marine ecosystems in Goal 14, "Conserve and Sustainably Use the Oceans, Seas, and Marine Resources." This goal includes specific targets, such as reducing marine pollution, protecting and restoring marine ecosystems, and regulating fisheries to avoid harming the balance of the ecosystem.

In the context of Indonesia, which is an archipelago with the second-longest coastline in the world, sustainable marine management is increasingly important. As a country with abundant marine resources, Indonesia plays a strategic role in global marine conservation. Various national and local policies have been developed to support sustainable marine management, such as marine conservation programs, enforcement against illegal fishing practices, and efforts to reduce plastic waste polluting the oceans(Rachman et al., 2023). However, the challenges in implementing these policies remain significant, especially at the local level.

At the village and sub-district levels, the implementation of SDGs related to marine management heavily depends on community involvement and support from local governments(Hakim et al., 2024). In this regard, Kalibaru Village, as a coastal area, plays a key role in supporting the achievement of these goals. Given its location adjacent to the Java Sea, the sustainability of marine resources in Kalibaru is crucial for the well-being of the local population, most of whom are fishermen and maritime-related business owners. This study will focus on how marine environmental management in Kalibaru is implemented to support the SDGs at the village level, while also exploring the challenges and opportunities within these efforts.

Thus, marine environmental management is not only related to environmental conservation but also closely linked to economic development and community welfare. Effective marine management will provide long-term benefits for coastal communities, preserving valuable natural resources and supporting the achievement of SDG goals, both globally and locally(Humairah, 2023).

Kalibaru Village, as a coastal area bordering the Java Sea, holds a strategic role in marine environmental management, not only to support the welfare of the local community but also as part of national efforts to maintain the sustainability of marine ecosystems. As one of the densely populated coastal areas, Kalibaru significantly depends on marine resources to sustain the local economy, primarily through the fishing, maritime transport, and trade sectors. These economic activities are closely tied to the health of the surrounding marine environment. When the marine environment is well-maintained, the community continues to enjoy the benefits of the marine ecosystem, such as abundant fish, clean water, and protected coastlines.

However, Kalibaru is also facing serious challenges that disrupt the balance of its marine ecosystem. One of the main problems is pollution from industrial and domestic activities. Waste disposal from households, industries, and ships sailing through nearby waters has caused significant pollution in the coastal areas. Plastic waste, one of the most visible forms of pollution, not only harms the aesthetic value of the marine environment but also endangers marine life such as fish and turtles, which are vulnerable to ingesting or becoming entangled in plastic debris. Pollution from hazardous chemicals also impacts water quality and directly affects fish catches, ultimately affecting the livelihoods of local fishermen.

In addition to pollution, the issue of overfishing also presents a major challenge. Uncontrolled fishing, particularly with destructive gear such as trawl nets, has caused a decline in fish

populations in the waters of Kalibaru. This not only reduces the number of fish available for capture but also disrupts the marine food chain, leading to an overall imbalance in the ecosystem. This decline in fish stocks also poses a threat to food security for coastal communities that rely heavily on fish for their daily consumption.

Furthermore, ecosystem degradation, such as the destruction of coral reefs and mangroves, poses a significant threat(Nichols et al., 2019). Damaged coral reefs, whether from human activities such as coral mining or the use of explosives for fishing, or from global warming, play a critical role as habitat and breeding grounds for many marine species. Without healthy coral reefs, the populations of fish and other marine life can drastically decline(Jones et al., 2004). Similarly, mangrove forests, which act as natural coastal barriers against erosion and provide breeding grounds for various marine species, are increasingly being lost due to land conversion for settlements or economic activities.

These challenges not only threaten the sustainability of marine resources in Kalibaru but also the welfare of communities that depend on the ocean. The degradation of the marine environment can create a new cycle of poverty, where fishing communities lose their main source of income while the natural resources they rely on continue to deteriorate. Additionally, the increased risk of natural disasters, such as flooding due to the loss of mangrove forests, presents a real threat to the safety of coastal communities.

This research aims to comprehensively analyze the implementation of marine environmental management in Kalibaru Village and identify the extent to which these management strategies and practices contribute to the achievement of the Sustainable Development Goals (SDGs) at the village level, particularly in relation to Goal 14 on the preservation of marine ecosystems. In this context, the study will explore various aspects of marine management, including the role of the government, community involvement, and the impact of local policies and initiatives implemented in Kalibaru Village.

The analysis will focus on three main dimensions. First, an analysis of the policies and regulations implemented at the local level, including marine conservation efforts, waste management, and fisheries regulations aimed at maintaining ecosystem balance. This study will assess whether these policies have been effectively and consistently implemented, as well as their impact on the environment and the local community.

Second, this study aims to identify the main challenges faced in marine environmental management in Kalibaru Village, such as funding constraints, limited technical capacity, low environmental awareness, and lack of coordination among stakeholders. Identifying these challenges is essential to understanding the barriers that need to be addressed to achieve more sustainable marine management.

Third, the research will assess the impact of the implementation of marine environmental management on the achievement of the SDGs at the village level, particularly in terms of improving the welfare of coastal communities, preserving ecosystems, and mitigating environmental risks such as pollution and overfishing. This study will also examine how community involvement in marine environmental management can influence the success of the SDGs at the local level and how good management practices can be strengthened and expanded to deliver more significant impacts.

The results of this study are expected to provide relevant recommendations to improve the effectiveness of marine environmental management in Kalibaru Village and support the sustainable achievement of the SDGs at the village level. Thus, this research will not only

contribute to a better understanding of the current state of marine environmental management but also provide guidance for policymakers, communities, and other stakeholders in strengthening strategies for long-term, sustainable environmental management.

## 2. Metode Penelitian

The research method used in this study is a qualitative method with a case study approach. This approach was chosen because it allows the researcher to conduct an in-depth exploration of the implementation of marine environmental management in Kalibaru Village and its relationship to the achievement of the Sustainable Development Goals (SDGs) at the village level. This research relies on primary data obtained from in-depth interviews with key stakeholders, including village officials, district government representatives, community leaders, fishermen, and other parties involved in marine environmental management. The interviews aim to gain an understanding of the implementation of marine environmental management policies, the challenges faced, and the contributions of each party in these efforts. In addition, field observations were conducted to directly assess the condition of the marine environment in Kalibaru Village, including the management practices implemented, the condition of the ecosystem, and the impact of human activities on the sea and coastal areas. These observations aim to verify the information obtained from the interviews while also capturing the physical and social situation of the area.

The data analysis was carried out in several steps. First, all interview results were transcribed in detail to obtain complete textual data. Next, the data were analyzed using thematic coding techniques, where the data were broken down into key themes that emerged from the interviews and observations. These themes were then interpreted to identify important patterns in marine environmental management, such as the main problems encountered, the solutions proposed, and the success of the initiatives implemented. Data triangulation was carried out by comparing the results of the interviews, field observations, and secondary data to ensure the validity and consistency of the findings. Finally, conclusions were drawn based on the analysis results, organizing the findings in line with the research objectives, which are to understand the implementation of marine environmental management in Kalibaru and its role in supporting the achievement of SDGs at the village level.

## 3. Finding and Discussion

### Analysis of policies and regulations implemented

The policies and regulations implemented in Kalibaru Village regarding marine environmental management encompass several important aspects related to marine conservation, waste management, and fishing regulations. However, challenges in implementation remain a major obstacle to the success of these policies. In efforts to maintain the balance of coastal ecosystems, the local government has launched conservation programs, such as the rehabilitation of mangroves and coral reefs, to protect the coastal environment from erosion and provide habitats for marine life. Mangroves play a vital role in stabilizing coastlines and providing shelter for marine species, while healthy coral reefs help increase fish populations, which are essential for the livelihoods of local fishermen. However, despite the good intentions of these policies, their implementation is often hindered by funding limitations, technical resource constraints, and limited community involvement. Many conservation projects are delayed or even halted due to a lack of sustainable support from various stakeholders. On the other hand, local community participation in conservation programs is still suboptimal.

Although there is growing awareness of the importance of environmental conservation, many residents lack sufficient knowledge on how to contribute effectively.

One of the major issues faced by Kalibaru Village is the increasingly concerning marine pollution. Domestic waste, particularly plastic, is one of the main sources of pollution in this coastal area. Plastic waste, carelessly discarded by residents and industries near the coast, pollutes the waters and has harmful effects on the marine ecosystem. Marine life such as fish, turtles, and seabirds often become entangled in or ingest plastic, which can result in their death. Moreover, waste from factories operating near this area further worsens the situation. Many industries in the vicinity of Kalibaru Village discharge hazardous chemical waste into the waters without adequate treatment. This waste pollutes the water, degrades its quality, and poisons the marine ecosystem. Although existing policies and regulations address waste management, their implementation remains far from optimal. The lack of waste processing facilities, coupled with weak oversight of industrial activities, has led to continued marine pollution. The local government has, in fact, issued strict regulations prohibiting the disposal of waste into the sea, but field implementation is often hampered by a lack of public awareness and weak law enforcement.

In addition to plastic and industrial waste, household waste is also a significant issue in Kalibaru Village. Many households still lack access to adequate waste management systems, resulting in waste often ending up in the sea. This type of pollution not only poses an environmental problem but also directly impacts the health of the coastal population. Accumulated waste on the beaches can become breeding grounds for diseases, while water contaminated by chemical waste can endanger the communities relying on the sea for water sources or fish consumption. In this regard, stronger efforts are needed to raise public awareness about the importance of maintaining clean seas and the surrounding environment. Furthermore, developing better waste management infrastructure and providing education to the community about sustainable waste management should be prioritized in the region's environmental management strategies.

Meanwhile, regarding fisheries regulations, the local government has established rules concerning permissible fishing gear and designated fishing areas. The ban on destructive fishing gear, such as trawling nets, aims to protect marine ecosystems from further damage. Such gear is known to destroy coral reefs and disrupt the ecosystem by overharvesting fish. In addition, several fishing zones have been designated as temporary no-fishing areas to allow fish stocks to recover. This policy aligns with global efforts to prevent overfishing and preserve marine resources for future generations. However, the implementation of these regulations in the field still faces various challenges. One of the main issues is inadequate supervision, which leads many fishermen to continue using prohibited fishing gear. Economic hardship forces many fishermen to violate regulations to sustain their livelihoods. Moreover, the lack of alternative employment outside the fishing sector makes it difficult to effectively enforce these regulations.

To ensure the success of the policies and regulations on marine management in Kalibaru Village, a more holistic and coordinated approach is needed. Synergy between the government, the community, and the private sector must be strengthened to address these challenges. The government needs to enhance oversight and law enforcement, provide adequate waste treatment facilities, and support fishermen with more sustainable economic alternatives. Meanwhile, the community must be more involved in decision-making processes and provided with adequate education on the importance of protecting marine ecosystems. With the right measures in place,

Kalibaru Village can become a model for sustainable marine environmental management and significantly contribute to achieving the SDGs, particularly Goal 14 on preserving marine ecosystems.

**The Main Challenges Faced in Marine Environmental Management**

The main challenges faced in marine environmental management in Kalibaru Village include funding constraints, limited technical capacity, and the lack of environmental awareness among the community. Although coordination between government agencies has been fairly well established, these issues remain significant obstacles to achieving sustainable and effective environmental management.

First, funding constraints are one of the most significant problems. Many initiatives related to environmental management, such as waste management and educational campaigns, require substantial financial resources for their implementation. However, available funding is often limited and not always reliable. Dependence on local government budget allocations or external assistance often falls short of sustaining long-term programs. This causes many planned programs to operate on a small scale or fail to be implemented optimally. Some programs may start well, but due to financial constraints, they cannot be continued or further developed.

Second, the limited technical capacity is another barrier in marine environmental management in Kalibaru. Both the local community and the government often lack the knowledge and skills needed to carry out effective environmental management. For example, in terms of waste management, many residents are still unfamiliar with proper methods for sorting waste, recycling, or handling hazardous materials. In addition, technology that could help monitor environmental conditions or reduce pollution has not been widely adopted, either due to lack of knowledge or limited access to such technologies. The absence of continuous training and specialized environmental education exacerbates the situation, making environmental management less effective.

Third, the lack of environmental awareness among the public is also a significant challenge. Although some people are becoming more aware of the importance of environmental conservation, the majority of the population still does not fully understand the negative impact of behaviors like littering, particularly with plastic waste, in the ocean. Plastic waste is one of the major problems facing coastal areas, and without broader awareness of the need to keep the environment clean, it is difficult to reduce the continually increasing level of pollution. Environmental education programs do exist, but they have not reached all segments of society effectively, especially fishermen and coastal communities who are directly impacted by the condition of the marine environment.

Nevertheless, coordination between the central, regional, and village governments in Kalibaru has been relatively good in terms of policy formulation and the implementation of environmental programs. The local government has made efforts to enforce environmental management policies, such as regulating waste disposal and monitoring industrial activities in the area. Collaborative programs between the government and various parties, including non-governmental organizations, have also been established to address environmental issues in coastal areas. This good coordination reflects the government's commitment to addressing environmental issues in Kalibaru, although stronger efforts are still needed to implement policies at the community level.

With good coordination from the government, the remaining challenges such as lack of funding, limited technical capacity, and low environmental awareness in the community become the main focus that must be addressed. To achieve success in marine environmental management, further efforts are needed to enhance community capacity through training, expand access to environmentally friendly technologies, and strengthen environmental education at various levels. In this way, Kalibaru Village can be better prepared to face these challenges and achieve more sustainable environmental management in the future.

**The Impact of Marine Environmental Management Implementation on the Achievment of the Villages SDGs**

Despite major challenges such as high levels of marine pollution remaining a significant obstacle in environmental management in Kalibaru Village, there are several positive aspects that can be drawn from the implementation of marine environmental management in achieving the SDGs at the village level. The efforts undertaken so far, although not yet fully optimal, have made notable positive contributions, particularly in the areas of public awareness, policy improvement, and local economic impact.

One of the most important positive aspects is the increased awareness of the community regarding the importance of protecting the marine environment. Although this awareness is not yet widespread, various educational programs run by the government and non-governmental organizations have begun to show results. Many community members, especially the younger generation and some fishing groups, have become actively involved in environmental activities, such as beach clean-ups and reducing the use of single-use plastics. This awareness is an important initial step toward supporting the sustainability of marine environmental management. Behavioral changes, though gradual, show progress in achieving the SDGs, especially SDG 14 (Life Below Water) and SDG 12 (Responsible Consumption and Production). This active community participation, if further enhanced, can serve as a foundation for the sustainability of environmental conservation programs in the future.

In addition, coordination between local governments has improved, which is a positive development in environmental management. Thanks to closer cooperation between local, village, and relevant stakeholders, policies on marine environmental management have begun to be implemented more consistently. This includes fisheries regulations that prohibit destructive fishing gear and efforts to limit overfishing. While the implementation of these regulations has not been perfect, they have helped protect fish stocks in the region and maintain the balance of the marine ecosystem, which is critical to achieving SDG 14. In the long term, if enforcement can be strengthened, these efforts could improve fisheries yields and support the economic welfare of coastal communities, while also protecting the natural resources on which they depend.

From an economic perspective, despite the high levels of pollution, better marine environmental management has begun to have a positive impact on the livelihoods of local fishermen. Regulations such as restrictions on fishing in certain zones, although not yet fully successful, have helped some fishermen achieve more stable catches. The recovery of fish stocks due to conservation efforts and better regulations has had a positive impact on fishermen's incomes. This contributes to achieving SDG 1 (No Poverty) and SDG 8 (Decent Work and Economic Growth) at the village level. This sustainability is crucial as the fisheries sector is a main pillar of the economy in Kalibaru, and efforts to protect marine resources will provide long-term benefits for the local community.

In terms of health improvements, while the pollution challenges remain significant, several waste management programs, such as improved waste handling, have begun to show impact. Some areas in Kalibaru Village, particularly those closer to environmental education centers, have seen a reduction in the amount of waste ending up in the sea. Although there is still much to be done to address pollution comprehensively, these early steps indicate the potential for improvement. In the long run, if waste management is improved, the community will benefit in terms of health, as cleaner water and a healthier environment will reduce the risks of diseases associated with pollution. This contributes to the achievement of SDG 3 (Good Health and Well-being).

Local initiatives that have emerged as part of environmental policy implementation have also had a positive impact in promoting innovation in the environmental field. For example, several community groups have started small businesses related to processing plastic waste into recycled products or using sustainable farming methods on coastal land. These initiatives not only reduce the environmental pollution burden but also provide economic alternatives for the local community, contributing to the achievement of SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities).

Overall, despite major challenges such as high levels of marine pollution that have turned the water black and disrupted ecosystems, there are positive aspects emerging from the implementation of marine environmental management in Kalibaru Village. The increasing awareness among the community, better government coordination, and the emerging economic benefits are positive signs that could serve as a foundation for more effective environmental management in the future. However, to ensure greater and more sustainable impacts, improvements in waste management, policy strengthening, and stronger technical and financial support are needed to ensure that the SDGs in Kalibaru Village can be achieved optimally.

## 4. Conclusion

Marine environmental management in Kalibaru Village plays an important role in maintaining the balance of marine ecosystems and supporting the welfare of coastal communities, most of whom rely on marine resources for their livelihoods. However, significant challenges are still being faced, particularly related to high levels of marine pollution, limited technical capacity, low community awareness, and funding constraints. Although there are already policies and regulations related to environmental management in place, their implementation is still not optimal, as indicated by the high level of seawater pollution, which causes the water to turn black and the quality of the marine ecosystem in the area to decline.

On the positive side, increasing environmental awareness among the community, especially among the younger generation and some fishing groups, along with improved coordination between the government and stakeholders, has contributed to marine conservation efforts and more sustainable management of fishery resources. The implementation of marine environmental management has also shown positive impacts on the local economy, particularly for fishermen who are beginning to experience more stable fish catches due to efforts to control overfishing and protect fishing zones.

However, to achieve more effective and sustainable marine environmental management and to support the optimal achievement of the Village SDGs, further efforts are needed to strengthen environmental education, improve regulation enforcement, and expand access to environmentally friendly technology. Stronger and more sustainable financial support is also needed to ensure that environmental management programs can be properly implemented. With

better synergy between the government, the community, and the private sector, Kalibaru Village can become a model for sustainable marine environmental management, which not only supports the welfare of the local community but also contributes to the global preservation of marine ecosystems.

**5. Acknowledgements**

The authors would like to express their deepest gratitude to all parties who kindly collaborated and provided support during this research.

**6. Declaration of Conflicting Interests**

The authors declare that there is no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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