


# **ANALYSIS OF THE IMPLEMENTATION OF THE RTRW LOCAL REGULATION IN COASTAL BOUNDARY PROTECTION**

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## **Abstract**

Settlement development in the coastal area of Sendangmulyo Village has significant environmental and socioeconomic impacts. This research analyzes the impact of development as well as constraints in the implementation of the Rembang Regency RTRW Regulation 2023-2043 related to coastal boundary protection. A qualitative approach was used with data collection techniques in the form of interviews, observations and document studies. Data analysis was conducted using content analysis. The results showed that settlement development causes damage to coastal ecosystems, such as loss of natural vegetation and increased risk of abrasion and tidal flooding. Socio-economically, this development triggers conflicts between economic interests and environmental preservation, and shows low public awareness of coastal ecosystem protection. In the implementation of the Rembang Regency RTRW regulation 2023-2043, three main obstacles were found: lack of supervision, lack of public awareness, and weak coordination between related parties. This research



found that weak inter-agency coordination is a major factor in the ineffectiveness of the coastal boundary protection policy, an aspect that has not been studied much before. Conflicts of economic and environmental interests in Sendangmulyo Village are also more complex compared to other areas due to the lack of community understanding of the applicable regulations. This research contributes to uncovering the specific impacts of residential development on coastal ecosystems after the implementation of the 2023-2043 Regional Spatial Planning Regulation. Protection of riparian areas requires strengthening regulatory oversight, continuous community education, and increased cross-sectoral coordination to optimize the implementation of the Rembang Regency RTRW 2023-2043.

### KEYWORDS

RTRW regulation, coastal boundary, development impact, Sendangmulyo village, coastal ecosystem.

## Introduction

Coastal settlements are a strategic issue that requires serious attention, both in the context of environmental protection and regional spatial planning. The coastal zone has very important ecological and economic functions, such as buffering coastal ecosystems, natural protection from abrasion, and absorption zones for climate change impacts such as sea level rise. However, pressures from urbanization and uncontrolled development in these areas have triggered environmental degradation and increased disaster risks for coastal communities.<sup>1</sup>

The government has regulated the management mechanism of coastal areas and small islands in Indonesia through Law Number 1 of 2014 concerning Amendments to Law Number 27 of 2007 concerning

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<sup>1</sup> Sri Puryono et al., *Ecosystem-Based Coastal and Marine Management*, Diponegoro University Publishing Agency, Semarang (Semarang: Diponegoro University Publishing Agency, Semarang, 2019), [http://eprints.undip.ac.id/77815/1/Pengelolaan\\_Pesisir\\_dan\\_Laut\\_Cetak.pdf](http://eprints.undip.ac.id/77815/1/Pengelolaan_Pesisir_dan_Laut_Cetak.pdf), page 175

Management of Coastal Areas and Small Islands (UU PWP3K). Article 5 of the UU PWP3K states that:

“Coastal Area and Small Island Management includes planning, utilization, supervision, and control activities regarding human interaction in utilizing Coastal and Small Island Resources and natural processes in a sustainable manner in an effort to improve the welfare of the Community and maintain the integrity of the Unitary State of the Republic of Indonesia.”

In addition, in the utilization of coastal areas, it is very important to pay attention to the provisions contained in Article 35 letter l of UU PWP3K which states that:

“In the utilization of Coastal Areas and Small Islands, every person is directly or indirectly prohibited from:

I. carrying out physical development that causes environmental damage and/or is detrimental to the surrounding community.”

Shoreline protection is a crucial element in maintaining the balance of coastal ecosystems and environmental sustainability. As a buffer zone between land and ocean, coastal fringes play an important role in preventing abrasion, protecting marine biota habitats, and reducing the impact of natural disasters such as tsunamis and tidal floods. However, the implementation of this protection often faces various challenges, including land abuse that is not in accordance with the provisions, especially related to unplanned residential development.<sup>2</sup>

Putri Kinanti's research (2024) highlights the importance of land use and utilization conformity with the Detailed Spatial Plan (RDTR) in Glagah Beach, Kulon Progo. This research emphasizes the need to control spatial utilization to prevent environmental degradation. Iswar Arisah (2021) examined the implementation of permits based on the Bulukumba Regency

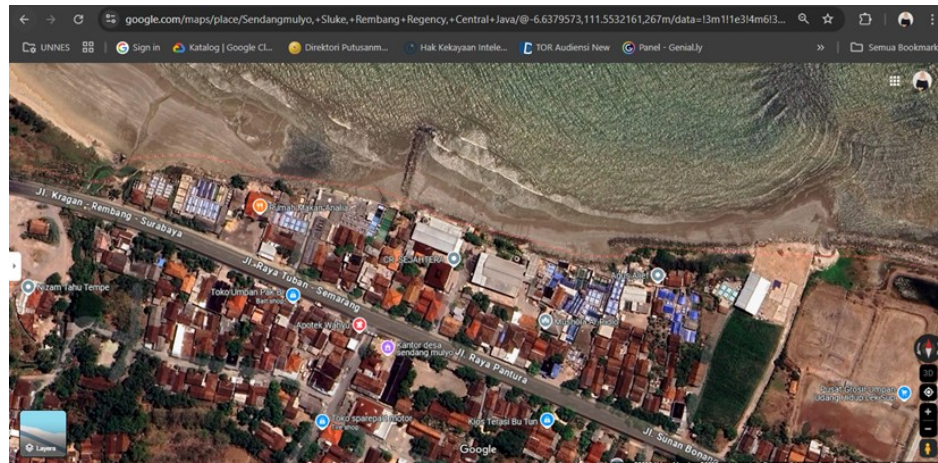
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<sup>2</sup> Adinegoro Randy and Rheza Kurnia, “Legal Analysis of Granting of Land Rights on the Coastal Border,” *Jurnal Pertanahan* 13, no. 2 (2023): 133–41, <https://jurnalpertanahan.id/index.php/jp/article/view/231>, pages 137-138

RTRW regulation, finding administrative and social barriers in the application of the regulation, which hindered the protection of coastal boundary areas. Furthermore, Ruananda Kharismatica Laksono (2021) explored the implementation of land certification in the coastal area of Rembang Regency, showing a mismatch between land use and applicable regulations.

In addition, Eka Puji Lestari's research (2024) reviewed the norms related to building permits in the coastal border area of Sigandu Batang, and highlighted the need for policy revisions to strengthen its implementation. Rinaldi Sinabariba (2022) in his thesis juridically reviewed the impact of the establishment of settlements on the coast of Sibolga City, and concluded that the development often ignores environmental impact assessments. Finally, M. Alamsyah and Ulul Hidayah (2023) evaluated land use in the Tanjung Uban coastal boundary area, and illustrated the importance of an environment-based approach in coastal planning.

Although these studies have made important contributions to understanding coastal zone management issues, there are several gaps that have not been identified. Firstly, previous studies have mostly focused on administrative, legal, or licensing norms, but have not explored in depth the impact of residential development on coastal ecosystems locally, particularly in Sendangmulyo Village. Second, although Rembang Regency has a RTRW regulation for 2023-2043, its implementation at the village level has not been widely studied, especially in the context of coastal boundary protection. Third, existing research has not specifically linked spatial regulations to the economic conditions of local communities, which is often a factor inhibiting policy implementation.



**Figure 1** Sendangmulyo Village Settlement  
(source: Google Maps screenshot)


Sendangmulyo Village, as one of the areas in Rembang Regency, is a clear example where settlement development has exceeded the Built-up Area Coefficient Limit or Built-up Area Coefficient Limit (BKWT) specified in the Regional Regulation on the Regional Regulation on Rembang Regency Regional Spatial Planning for 2023-2043 (Rembang Regency RTRW Regulation for 2023-2043). The picture shows dense settlements in the coastal boundary area. This condition not only creates the potential for environmental damage, but also reflects obstacles in the implementation of the regulation. Until now, there has been very limited research that specifically evaluates the impacts and constraints of the implementation of the Rembang Regency RTRW Regional Regulation for 2023-2043 in Sendangmulyo Village.


Based on the current conditions in the field, as stated in the explanation of Article 88 paragraph (2) letter n of the Rembang Regency RTRW Regional Regulation 2023-2043, Sendangmulyo Village has exceeded the Built-Up Area Coefficient Limit (BKWT). It is explained in the explanation of the article that the residential area in Sendangmulyo (Sluke) with a building area on the coastal border reaches 1.44 hectares, while the total coastal border area is 4.8137 hectares. This shows that there are already 29.91% of buildings standing, and the total direction of KWT also reaches 29.91%.

No.	Kawasan	Luas bangunan di sempadan pantai (Ha)	Luas sempadan pantai (Ha)	% bangunan	Arahan KWT %
1	Kawasan pergaraman Tunggulsari - Tasikharjo Kaliori	0	53,6530	0	10
2	Kawasan perikanan budidaya Tasikharjo-Bogoharjo Kaliori	4,43	33,6602	13,36	13,36
3	Kawasan pergaraman Purworejo Kaliori	0	1,6950	0	10
4	Kawasan peruntukan industri Bogoharjo Kaliori	2,61	9,9165	26,32	26,32
5	Kawasan permukiman Rembang	23,40	61,7335	37,91	37,91
6	Kawasan perikanan budidaya Rembang	0	4,375	0	10
7	Kawasan pergaraman Tireman - Pasarbanggi	0	9,9840	0	10
8	Kawasan pergaraman Tritunggal - Dasun	0,34	26,0985	1,3	10
9	Kawasan perikanan budidaya Tritunggal - Tasiksono	0,28	74,6605	0,37	10
10	Kawasan permukiman Bonang - Binangun (Lasem)	1,87	20,37	9,18	10
11	Kawasan peruntukan industri Leran-Pangkalan (Sluke)	4,95	43,3035	11,43	11,43
12	Kawasan permukiman Pangkalan - Sluke	1,59	34,3636	4,63	10
13	Kawasan peruntukan industri Jatisari (Sluke)	0,26	20,6002	1,26	10
14	Kawasan permukiman Manggar-Blimbing (Sluke)	3,16	13,8231	22,86	22,86
15	Kawasan peruntukan industri Sendangmulyo (Sluke)	0	26,3193	0	10
16	Kawasan permukiman Sendangmulyo (sluke)	1,44	4,8137	29,91	29,91
17	Kawasan perikanan budidaya Labuhan Kidul (Sluke)	0,006	8,0574	0,074	10
12	Kawasan permukiman perdesaan Summersari Kragan	1,37	13,9807	9,7	10
13	Kawasan peruntukan industri Sumurtawang-Kragan	1,38	16,1960	8,52	10
14	Kawasan permukiman Sumurtawang-Plawangan (Kragan)	8,66	25,05	34,57	34,57
15	Kawasan peruntukan industri Plawangan	0,47	7,11	6,61	10
16	Kawasan permukiman perkotaan Balongmulyo-Tegalmulyo-Kragan-Kebloran-Tanjungan	15,94	61,15	26,07	26,07
17	Kawasan peruntukan industri Kalipang Sarang	2,40	17,16	13,99	13,99
18	Kawasan permukiman Kalipang s/d Temperak (Sarang)	14,34	38,83	36,93	36,93
19	Kawasan peruntukan industri Temperak	1,23	13,59	9,05	10

Sumber: Data dan Analisis (per Juli 2022)

Ket:

 KWT eksisting dan telah melampaui maksimal

 KWT maksimal kawasan

**Figure 2** BKWT (Explanation of Article 88 paragraph (2) letter n of the Rembang Regency RTRW Regional Regulation 2023-2043)

This research offers a novelty by analyzing the implementation of the Rembang Regency RTRW Regional Regulation 2023-2043 in coastal boundary protection in Sendangmulyo Village, which is facing pressure due to settlement development that exceeds the coastal boundary line. Another novelty lies in the research approach that not only examines the legal and



administrative aspects, but also the ecological and social impacts of residential development in the area. In addition, this research aims to identify constraints in the implementation of the Rembang Regency RTRW Regional Regulation 2023-2043 at the local level and provide relevant recommendations to strengthen the protection of riparian areas in Rembang Regency.

The urgency of this research lies in the urgent need to protect the coastal fringe area in Sendangmulyo Village, given the negative impacts arising from unregulated settlement development. In the long run, ignoring spatial regulations will result in the destruction of coastal ecosystems, which is not only detrimental to the environment but also to the welfare of local communities. This research is expected to contribute to policy makers, academics, and the community in understanding the importance of coastal fringe area protection, as well as encouraging the implementation of more effective and sustainable spatial policies in Rembang Regency.

This research aims to answer two main questions: (1) What are the impacts of residential development on the coastal zone in Sendangmulyo Village? and (2) What are the constraints in the implementation of the Rembang Regency RTRW Regional Regulation 2023-2043 in Sendangmulyo Village related to the protection of the coastal zone? By exploring these issues, this research is expected to offer relevant solutions to overcome spatial planning problems in coastal areas, while supporting environmental sustainability on a local and global scale.

## Methods

This research uses a qualitative approach with an empirical juridical method to understand the impact of residential development on the coastal boundary and the obstacles to the implementation of the Rembang Regency Regional RTRW Regulation for 2023-2043 in Sendangmulyo Village. This approach allows in-depth analysis of phenomena that occur in the community through direct observation, interviews, and documentation

studies. The focus of the research was limited to two main aspects, namely the impact of residential development on the coastal boundary on the environment and the community and the constraints in the implementation of regulations related to the protection of the area. This research was conducted in various relevant locations, such as the Sendangmulyo Village Office, the coastal fringe area, and related agencies, in order to obtain data from various perspectives, both from the government and the community.

The data sources in this research consist of primary data obtained through field observations and interviews with relevant informants, as well as secondary data which includes primary legal materials (laws and regional regulations), secondary legal materials (books, journals, theses), and other official documents. Data collection techniques include observation, interviews, literature study, and documentation study. To ensure data validity, triangulation techniques were used, by comparing data from various sources and methods. Data analysis was conducted using the content analysis method, which includes collecting, reducing, presenting data, and drawing conclusions.<sup>3</sup> The results of this research are expected to provide concrete recommendations for the improvement of coastal boundary protection policies in Rembang Regency.

## **Results and Discussion**

### **1. The Impact of Settlement Development in the Coastal Zone of Sendangmulyo Village**

#### **a. Environmental Impact**

Residential development in the coastal zone of Sendangmulyo Village has had a significant impact on the environment. Based on interviews with village officials, local residents, the Spatial Planning

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<sup>3</sup> Ahmad Rijali, "Qualitative Data Analysis," *Alhadharah: Journal of Da'wah Science* 17, no. 33 (2019): 81, <https://doi.org/10.18592/alhadharah.v17i33.2374>, pages 94-95



Office, the Environmental Agency, and Satpol PP, these environmental impacts can be broken down into two main issues, namely the degradation of the riparian ecosystem and increased disaster risk.

#### 1) Coastal Ecosystem Damage



**Figure 3** Coastal Zone Condition of Sendangmulyo Village (source: taken by the author, 2025)

Coastal ecosystems includes various environmental components, such as mangroves, seagrasses, and coral reefs, which interact in a system to maintain a balanced coastal ecology.<sup>4</sup> However, the development of settlements on the coastal border of Sendangmulyo Village has caused the loss of natural vegetation. Based on an interview with Naili Fauziah, S.Si., S.Pd. as the Subordinator of Planning and Environmental Impact Assessment of the Environmental Agency of Rembang Regency on January 14, 2025, she explained:

“The construction of houses in this area has replaced natural vegetation, such as mangroves, which should function as natural coastal protection from abrasion and sea waves.”

The loss of mangroves in the area has contributed to an increased risk of abrasion and coastal degradation, as well as reduced

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<sup>4</sup> Ramli Utina et al., *Coastal Ecosystems and Natural Resources*, Depublish CV Budi Utama, First (Sleman: Depublish CV Budi Utama, 2018), <https://repository.ung.ac.id/get/karyailmiah/3544/Ramli-Utina-Buku-Ekosistem-Dan-Sumber-Daya-Alam-Pesisir.pdf>, page 9

resilience of the coastal area to large waves and other natural disasters.

According to Choudhary et al (2024), mangroves are ecosystems that have high ecological value because they can prevent erosion, and provide habitat for various types of marine life.<sup>5</sup> However, in Sendangmulyo Village, mangroves have been replaced by densely populated settlements, making the coastline increasingly vulnerable to abrasion. This condition is exacerbated by the fact that local communities dump domestic waste directly into the sea.



**Figure 4** Domestic/household waste disposed of in the coastal boundary area  
(source: taken by the author, 2025)

In addition, damage to the sand ecosystem, which is an important component of the coastal environment, is also a concern. Beach sand plays a significant role in absorbing waves and preventing erosion.<sup>6</sup> However, development activities in Sendangmulyo Village have changed the characteristics of the beach sand to become denser, leading to the loss of the sand's ability to absorb wave energy optimally.

<sup>5</sup> Bhavesh Choudhary, Venerability Dhar, and Anil S. Pawase, "Blue Carbon and the Role of Mangroves in Carbon Sequestration: Its Mechanisms, Estimation, Human Impacts and Conservation Strategies for Economic Incentives," *Journal of Sea Research* 199, no. May (2024): 102504, <https://doi.org/10.1016/j.seares.2024.102504>, page 2

<sup>6</sup> G Masselink et al., "Impacts of Climate Change on Coastal Geomorphology and Coastal Erosion Relevant to the Coastal and Marine Environment Around the UK," *MCCIP Science Review*, no. January (2020): 158–89, <https://doi.org/10.14465/2020.arco8.cgm>, page 185



**Figure 5** Ongoing development activities in Sendangmulyo Village  
(source: taken by the author, 2025)

Residential development in the coastal border area of Sendangmulyo Village has put great pressure on the coastal ecosystem. Anik Kristiana, S.T., M.M., as the Junior Expert of Environmental Impact Control of the Environmental Agency of Rembang Regency interviewed on January 15, 2025, stated that:

"The uncontrolled construction of houses in the coastal boundary area has caused the loss of natural vegetation, such as mangrove trees and other coastal protective vegetation. In fact, these plants function to reduce erosion and protect the coastline from abrasion."

Furthermore, he added that this condition is further exacerbated by the absence of coral reefs in the coastal area of Sendangmulyo Village, which should act as a support for the marine ecosystem and a natural barrier against waves. This phenomenon shows that development that is not in accordance with the principles of natural resource management can cause significant environmental degradation. Without decisive protection measures, coastal ecosystems will continue to decline, which in turn will also have an impact on the lives of surrounding communities.

According to Saroni as the Secretary of Sendangmulyo Village, interviewed on January 10, 2025, he said:

"The area that is now a settlement used to be an empty land with quite dense natural vegetation. However, over time, the construction of houses continued to grow, turning the coastal border area into a densely populated area."

These changes show how settlement expansion can eliminate the natural vegetation cover that should serve as a protective barrier for

coastal ecosystems.

In addition, the disposal of domestic waste directly into the sea is also a serious problem. According to Anik Kristiana, S.T., M.M., a Junior Expert in Environmental Impact Control at the Rembang Regency Environmental Agency, interviewed on January 15, 2025, explained that:

"Many residents still dispose of household waste directly into the sea, and this worsens water quality and disrupts the remaining marine biota habitat."

This practice not only pollutes the environment, but also accelerates the degradation of coastal ecosystems, which should be protected in accordance with applicable spatial regulations.

This damage shows a cumulative impact that not only reduces the ecological function of coastal areas, but also threatens environmental sustainability for future generations. The Environment Agency emphasizes that without restoration and protection efforts, this condition could continue to become ecosystem degradation that is increasingly difficult to recover from.

## 2) Increased Disaster Risk

Residential development on the coastal fringe directly increases the risk of disasters such as abrasion, tidal flooding and wave damage.<sup>7</sup> Abrasion is the process of shoreline loss due to continuous exposure to ocean waves. Based on Article 88 paragraph (2) of the Rembang Regency RTRW Regional Regulation 2023-2043, coastal fringe areas can be established with conditions, one of which is not to exceed the BKWT. However, violations of this regulation have reduced the natural protection function of the coastal area. The study by Rengga et al. (2024) states that mangrove vegetation can reduce the speed of seawater flow and strengthen coastal soil

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<sup>7</sup> Ima Nurmalia Permatasari, "Risk Study, Impact, Vulnerability and Mitigation of Abrasion Disasters in Several Coasts of Indonesia," *Journal of Tropical Marine Research (J-Tropimar)* 3, no. 1 (2021): 43–53, <https://doi.org/10.30649/jrkt.v3i1.56>, page 44

structure, thus effectively preventing abrasion.<sup>8</sup>

Tidal flooding is also a serious threat to the people of Sendangmulyo Village. This phenomenon occurs as a result of sea water rising inland during high tides, which is often exacerbated by high rainfall. According to research by Syafitri and Rochani (2022), tidal floods in Indonesia's coastal areas are increasingly frequent due to global sea level rise triggered by climate change.<sup>9</sup>



*Figure 6 The house of one of the residents that was destroyed by abrasion and big waves (source: taken by the author, 2025)*

The threat of large waves during the rainy season is increasingly real for the residents of Sendangmulyo Village, especially for those who live in the coastal border area. Muhammad Arief Firmansyah, ST, as the Head of Investigation Section of Satpol PP of Rembang Regency interviewed on January 17, 2025, revealed that:

"Several houses in Sendangmulyo Village suffered damage to the foundation due to the large waves that hit the stone border used as a barrier."

Unfortunately, even when stone borders are installed, this protection

<sup>8</sup> Andreas Rengga et al., "Mangrove Planting as an Effort to Prevent Abrasion on the Coast of Wailamung Village, Talibura District, Sikka Regency," *Community Development Journal* 5, no. 5 (2024): 8458–61, <https://doi.org/10.57218/jompaabdi.v3i3.1170>, page 8460

<sup>9</sup> Annisa Widya Syafitri and Agus Rochani, "Analysis of the Causes of Tidal Flooding in Coastal Areas Case Study: North Jakarta, East Semarang, Brebes Regency, Pekalongan," *Journal of Space Studies* 1, no. 1 (2022): 16, <https://doi.org/10.30659/jkr.v1i1.19975>, page 21



is often ineffective against large waves without the support of natural vegetation as an additional barrier.



**Figure 7** Stone borders that are made are not balanced with mangrove planting  
(source: taken by the author, 2025)

The reliance on artificial structures without considering ecological aspects suggests the need for a more sustainable approach to coastal disaster mitigation. The study by Utomo et al. (2024) confirms that a combination of hard infrastructure, such as stone borders, with nature-based solutions, such as mangrove replanting, can improve the resilience of coastal areas to abrasion and high waves.<sup>10</sup>

## **b. Socio-economic Impact**

Settlement development in the coastal area of Sendangmulyo Village not only impacts the environment, but also triggers increasingly complex socio-economic problems.

### **1) Conflict of Interest between Economy and Environment**

The conflict between the economic needs of the community and environmental protection is a problem that often occurs in coastal areas, including in Sendangmulyo Village. Settlement development on the coastal boundary is often driven by the economic needs of local communities, the majority of whom work as

<sup>10</sup> Ardhi Prasetyo Utomo et al., "Maximizing the Function of Mangrove Planting in Abrasion-Prone Areas of Jakarta," *Jurnal Ilmiah Nusantara* 1, no. 3 (2024): 12–22, <https://doi.org/10.61722/jinu.v1i3.1502>, pages 13-14



fishermen, small traders and day laborers. Locations close to the sea are considered strategic to support their livelihoods, even though this contradicts spatial policies and risks the sustainability of coastal ecosystems.

Mashudi as the Sendangmulyo Village Consultative Body, interviewed on January 10, 2025, explained that:

“Many residents depend on the fisheries sector and small businesses around the coast, so development in the coastal boundary area is often considered an economic opportunity, not an environmental threat.”

This reflects a conflict of interest between the economic needs of the community and the urgency of environmental protection, where people tend to prioritize short-term gains without considering the long-term impacts on the riparian ecosystem.



**Figure 8** Development ongoing to add to the economy (shrimp egg farms)  
(source: taken by the author, 2025)

In the perspective of natural resource management theory, the sustainable use approach asserts that natural resources must be managed by considering the balance between economic, social, and environmental aspects. However, in practice, development in Sendangmulyo Village focuses more on meeting short-term economic needs without taking into account long-term environmental impacts. This is in line with the views of Pearce & Turner (1990:93), who assert that resource management that does not consider long-term impacts will lead to environmental

degradation and a decline in the quality of life of the community in the future.<sup>11</sup>

In addition, the social aspect of natural resource management theory also emphasizes that local communities must be involved in the decision-making process related to resource utilization.<sup>12</sup> However, in the context of Sendangmulyo Village, spatial policies tend to be made in a top-down manner without the active participation of the community, resulting in resistance when the government conducts a crackdown on settlements in the coastal boundary area.

In Sendangmulyo Village, the exploitation of coastal areas for residential purposes has led to the loss of coastal protective vegetation and increased the risk of abrasion and tidal flooding. If not managed properly, these conditions will further deteriorate environmental quality and threaten the sustainability of coastal ecosystems.

The decline in the quality of the coastal environment not only affects the ecosystem but also the lives of local communities. Kalimah, a fisherman's wife in Sendangmulyo Village interviewed on January 15, 2025, revealed that her husband's fish catch has decreased drastically in recent years. She stated:

“My husband used to be able to get up to 10-15 kg of fish once at sea, now at most 5 kg. Sometimes even only 2-3 kg. Many of the fishing spots that used to be good, have now changed, maybe because the water is getting dirty and there are many buildings around the beach.”

This statement reflects the real impact of changes in coastal ecosystems due to uncontrolled development activities. This finding

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<sup>11</sup> David W. Pearce and R. Kerry Turner, *Economics of Natural Resources and the Environment* (Baltimore: Johns Hopkins University Press, 1990), [https://books.google.co.id/books/about/Economics\\_of\\_Natural\\_Resources\\_and\\_the\\_E.html?id=ex8vaG6m4RMC&redir\\_esc=y](https://books.google.co.id/books/about/Economics_of_Natural_Resources_and_the_E.html?id=ex8vaG6m4RMC&redir_esc=y), page 93

<sup>12</sup> Pearce and Turner, , page 129

is in line with research by Nusantara et al. (2023), which states that coastal ecosystem degradation can reduce the economic productivity of communities that depend on marine resources.<sup>13</sup>

In the perspective of environmental law, regulations related to the protection of coastal areas have been regulated in the UU PWP3K. This law mandates that coastal areas must be managed sustainably and must not be used for activities that damage their ecosystems. However, weak law enforcement and a lack of policy socialization mean that people do not fully understand or comply with this regulation.

According to Sands (2012), environmental law should be preventive, not just reactive, in addressing environmental problems.<sup>14</sup> However, in the case of Sendangmulyo Village, the legal approach used is more repressive, such as efforts to control settlements that often lead to conflict with the community. A preventive approach should be prioritized, for example by educating the community about the importance of maintaining coastal ecosystems and providing alternative settlement solutions that are safer and more sustainable.

In addition, Bodansky (2010) emphasizes that environmental law must also take into account aspects of social justice in its implementation.<sup>15</sup> In this context, spatial policies that restrict development in coastal boundaries should not only be oriented towards environmental protection, but also consider the impact on people's welfare.

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<sup>13</sup> Surya Dharma Nusantara et al., "Challenges of Coastal Area Management in South Halmahera Regency," *Indonesian Journal of Fisheries Community Empowerment* 3, no. 2 (2023): 216–25, <https://doi.org/10.29303/jppi.v3i2.2539>, page 222

<sup>14</sup> Philippe Sands et al., *Principles of International Environmental Law*, Cambridge University Press (Cambridge University Press, 2012), <https://doi.org/https://doi.org/10.1017/CBO9781139019842>, page 94

<sup>15</sup> Daniel M. Bodansky, *The Art and Craft of International Environmental Law* (Cambridge: Harvard University Press, 2010), [https://digitalcommons.law.uga.edu/fac\\_artchop/532/](https://digitalcommons.law.uga.edu/fac_artchop/532/), page 137

One approach that can be applied is integrated coastal zone management (ICZM), which emphasizes integrated management of coastal areas by involving various stakeholders.<sup>16</sup> This approach can be a solution in harmonizing economic interests and environmental protection, by ensuring that development in coastal areas still takes into account the principles of sustainability.

## 2) Public Awareness of Environmental Protection.

The awareness of Sendangmulyo Village community towards the importance of environmental protection is still relatively low. Based on research results, the majority of residents do not understand that development in the coastal boundary area can worsen environmental damage in the long term. This awareness is very important, considering that the coastal area has a vital role in maintaining the ecosystem and as a natural fortress against disasters.<sup>17</sup>

This was observed in interviews with several residents who showed that the level of awareness of environmental protection is still low. One of them, Juenai, Head of RT 03 RW 01 Sendangmulyo Village, interviewed on January 10, 2025, revealed that:

“I didn't know that building on the coastline could have a negative impact. The important thing is to have a place to live near the sea so that it is easier to go fishing.”

This statement shows the community's lack of understanding of spatial regulations and their impact on ecosystem balance. The study by Fang et al. (2023) corroborates this finding, stating that low levels of environmental literacy are often a major obstacle to the implementation of coastal spatial planning policies.<sup>18</sup>

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<sup>16</sup> Sands et al., *Principles of International Environmental Law* . , page 99

<sup>17</sup> Daniel Michael Alongi, “Impacts of Climate Change on Blue Carbon Stocks and Fluxes in Mangrove Forests,” *Forests* 13, no. 2 (2022): 149, <https://doi.org/10.3390/f13020149>.

<sup>18</sup> Wei Ta Fang, Arba'at Hassan, and Ben A. Lepage, *The Living Environmental Education: Sound Science Toward a Cleaner, Safer, and Healthier Future, Sustainable Development Goals Series* , vol. Part F2745 (Singapore: Springer, 2023), <https://doi.org/10.1007/978-981-19-4234-1> . , page 96

Although there has been no official reporting from the Environmental Agency regarding the habit of dumping domestic waste directly into the sea, interviews with local residents indicate that household waste management in Sendangmulyo Village is still inadequate. One resident, Murti, a housewife interviewed on January 15, 2025, revealed:

"There used to be a small ditch that flowed into the sea, but now many new houses dump their wastewater directly there. We know it's not good, but there's nowhere else to dump it."

Similarly, Saroni, the village secretary interviewed on the same day, also admitted that the drainage system in settlements around the coast is still limited, so household waste often flows directly into the sea. This lack of waste treatment facilities shows that public awareness of environmental management is still low, and reflects the lack of attention to sanitation aspects in coastal areas.

Damage to coastal ecosystems due to sewage pollution can have far-reaching impacts, not only on seawater quality, but also on the sustainability of fisheries resources that are the economic foundation of local residents. According to the theory of natural resource management (Pearce & Turner, 1990), coastal area management must pay attention to the balance between economic, social and environmental aspects so that sustainability can be maintained.<sup>19</sup>

However, the behavior of people who are still less concerned about environmental pollution shows a gap between short-term economic needs and efforts to preserve coastal ecosystems. Without socialization and a better waste management system, the potential for environmental degradation in this area will continue to increase, which in turn could threaten the welfare of the community itself.

Damage to coastal ecosystems also has a direct impact on the

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<sup>19</sup> Pearce and Turner, *Economics of Natural Resources and the Environment* .

economic productivity of coastal communities, especially fishermen. In this context, the theory of sustainable utilization emphasizes the importance of using natural resources wisely, without compromising the sustainability of the ecosystem for future generations. However, the low awareness of the Sendangmulyo Village community shows that the approach that has been taken so far has not been effective enough to encourage sustainable utilization.

Until now, there has never been any environmental counseling or socialization conducted by the village government or related agencies. Tasrikah, as the staff of the government section of Sendangmulyo Village, interviewed on January 10, 2025, stated:

"We have never held special counseling or socialization related to environmental protection, especially regarding the impact of development on the coastal boundary. So far, our focus has been more on village administration and building permits."

This statement was reinforced by the head of RT 03 RW 01, Jueni, who lives on the coast, said:

"As far as I know, there has never been a meeting or counseling about the environment in this village. We only know from fellow residents or see the changes around the beach ourselves."

This lack of socialization has left the community with little understanding of the importance of maintaining coastal ecosystems and the impact of their habits on the environment.

Without adequate education, it is difficult for people to realize the urgency of environmental protection. According to Hungerford and Volk's (1990) **Environmental Awareness** theory, effective environmental awareness requires not only one-way information, but also a more comprehensive approach, such as direct community involvement in environmental education and action activities. In the absence of sustained socialization and outreach, people tend to be less concerned about the ecological impacts of their activities,



making behavior change difficult to realize.<sup>20</sup> Therefore, more interactive strategies, such as participatory programs and continuous education, are needed so that people understand and contribute to protecting coastal areas.

Furthermore, although some residents are starting to show awareness of the importance of protecting the environment, especially those who have felt the direct impact of abrasion or tidal flooding, these initiatives are still limited. Direct experience of environmental disasters, as described in research by Asdami et al. (2024), is often a trigger for environmental awareness.<sup>21</sup> However, these experiences will not have a significant impact if they are not accompanied by government support and effective coordination.

In this context, the theory of **Community-Based Management** (Ostrom, 1990) may be a relevant approach. According to this theory, successful environmental protection requires the active participation of communities in local resource management. A community-based approach, which involves collaboration between the government, citizens, and local organizations, can be a solution to increase public awareness of environmental protection.<sup>22</sup> By actively involving the community, their sense of ownership of coastal resources will increase, so they are more motivated to maintain environmental sustainability.

In addition to the community-based approach, environmental law theory is also relevant in this context. Sands (2012) asserts that

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<sup>20</sup> Harold R. Hungerford and Trudi L. Volk, "Changing Learner Behavior Through Environmental Education," *The Journal of Environmental Education*, 21, no. 3 (1990): 8–21, [http://www.elkhornsloughctp.org/uploads/files/1374624954Changing\\_learner\\_behavior\\_-\\_H\\_and\\_V.pdf](http://www.elkhornsloughctp.org/uploads/files/1374624954Changing_learner_behavior_-_H_and_V.pdf).

<sup>21</sup> Essy Anesta Asdami et al., "Correlation Between Environmental Ethics and Community Behavior in Environmental Conservation: Literature Review," *Journal of Agricultural Science and Technology in Plant Science* 1, no. 2 (2024): 1–10, <https://journal.asritani.or.id/index.php/Hidroponik/article/download/34/66/144>, page 5

<sup>22</sup> Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action*, *Governing the Commons*, First (New York: The Press Syndicate of The University of Cambridge, 1990), <https://doi.org/10.1017/cbo9780511807763>.

environmental law should be preventive and encourage community participation in natural resource management.<sup>23</sup> However, in the case of Sendangmulyo Village, weak law enforcement and lack of policy socialization are obstacles in raising public awareness. Therefore, a more adaptive and participation-based legal approach is needed to create a more inclusive environmental protection policy.

Settlement development in the coastal border area of Sendangmulyo Village reflects the conflict between the economic needs of the community and environmental protection. In this case, natural resource management theory emphasizes the importance of a multidimensional approach that integrates economic, social, and environmental aspects.<sup>24</sup> A fair and sustainable spatial policy needs to be designed to meet the economic needs of residents without damaging the environment. In addition, raising public awareness of the importance of environmental protection should be a priority, involving a community participation-based approach.

## **2. Constraints in the implementation of the Perda RTRW Rembang Regency 2023-2043 in Sendangmulyo Village related to the protection of coastal boundaries**

The implementation of the Rembang Regency RTRW Regional Regulation for 2023-2043 related to coastal boundary protection in Sendangmulyo Village faces various obstacles that hinder the effectiveness of its implementation. Based on the results of observations and interviews with village officials, local communities, the Spatial Planning Office, the Environmental Office, and Satpol PP, several main factors were found to be obstacles in the enforcement of spatial planning policies and coastal environmental protection.

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<sup>23</sup> Sands et al., *Principles of International Environmental Law* . , page 94

<sup>24</sup> Pearce and Turner, *Economics of Natural Resources and the Environment* .

### a. Lack of Supervision

According to the theory of Natural Resource Management (Hardin, 1968), natural resources that are managed freely without regulation and supervision will experience excessive exploitation and uncontrolled environmental degradation.<sup>25</sup> The riparian area is part of coastal natural resources that have important ecological functions, including as an abrasion barrier, carbon sink, and habitat for marine flora and fauna. In this context, the lack of supervision of space utilization in the coastal zone of Sendangmulyo Village has led to uncontrolled land conversion, damaging the balance of the coastal ecosystem.

The results of field observations on January 15, 2025 and interviews with Anik Kristiana, ST, MM, as a Junior Expert in Environmental Impact Control of the Environmental Agency of Rembang Regency show that residential development in the coastal border area of Sendangmulyo Village is not well controlled. She stated:

"We don't have a special monitoring system related to coastal development, so it is difficult to detect violations early on."

This lack of supervision can be seen in the proliferation of unauthorized houses and the reduction of coastal vegetation, such as mangroves and sea cypress, which are supposed to serve as natural protection against abrasion.

In **Environmental Law** theory, according to Birnie, Boyle, and Redgwell (2021), the effectiveness of an environmental regulation is highly dependent on strict supervision and consistent law enforcement.<sup>26</sup> In the context of coastal management, existing

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<sup>25</sup> Garreth Hardin, "The Tragedy of the Commons Garrett Hardin," *Science* 162, no. 3859 (1968): 1243–48, <https://doi.org/10.1126/science.162.3859.1243>.

<sup>26</sup> Patricia Birnie, Alan Boyle, and Catherine Redgwell, *International Law & The Environment*, Third (New York: Oxford University Press, 2021), <http://oceanlaw.ru/wp-content/uploads/2017/10/International-Law-and-the-Environment-Third-Edition-Patricia-Birnie.pdf>.

regulations should be strictly enforced to ensure that coastal fringe areas are not misused for development purposes that violate spatial planning.

In practice, Article 88 paragraph (2) of the Rembang Regency RTRW Regional Regulation 2023-2043, which specifies BKWT in coastal areas, has not been optimally implemented. An interview on January 17, 2025 with Muhammad Arief Firmansyah, ST, as the Head of Investigation Section of Satpol PP Rembang Regency stated:

"We face obstacles in carrying out enforcement due to the limited number of personnel and lack of budget support for routine patrols in coastal areas."

Meanwhile, Moh. Nur Aziz, SE, MT, M.Eng. as the Head of the Spatial Planning Division of DPTARU of Rembang Regency added that coordination between agencies in handling spatial violations has not been effective. In an interview on January 14 2025, he stated:

"The lack of coordination between the local government, Satpol PP, and village officials has led to many spatial violations in the coastal boundary area not being handled properly."

As a result, supervision and prosecution of illegal development is slow and ineffective, so violations continue without strict law enforcement efforts.

Based on the results of these interviews, supervision of spatial planning violations is still weak with several main reasons as follows:

1. Limited human resources to conduct routine inspections of coastal areas;
2. Lack of local government budget to support continuous monitoring;
3. Lack of coordination between relevant agencies, such as the Spatial Planning Office, the Environmental Office, and Satpol PP, in taking firm action against spatial violations;

4. Weak sanctions for violators. According to Article 62 of the Spatial Planning Law which specifies "Any person who violates the provisions as referred to in Article 61, shall be subject to administrative sanctions."

Furthermore, Article 62 of the Spatial Planning Law outlines the intended administrative sanctions ranging from written warnings to administrative fines. However, the facts on the ground show that the houses that stand on the coastal boundary have never been demolished, and the number continues to grow

Based on data from the Sendangmulyo Village office, the number of houses in the coastal border area, precisely in RT 03 RW 01 from year to year, is as follows:

**Table 1** *Number of settlements in RT 03 TW 01 from year to year in the area*

No	Year	Total
1	2021	50 houses
2	2022	55 houses
3	2023	55 houses
4	2024	57 houses

Sources: Sendangmulyo Village Office Data, 2025

In the context of environmental law, this indecisiveness shows the existence of "regulatory failure", namely the failure of the government to enforce established regulations, as stated in Kristian's research (2023).<sup>27</sup>

## **b. Lack of Public Awareness in Coastal Protection**

<sup>27</sup> Indra Kristian, "Public Policy and Implementation Challenges in Indonesia," *DIALEKTIKA Journal: Journal of Social Sciences* 21, no. 2 (2023): 88–98, <http://thejournalish.com/ojs/index.php/thejournalish/article/view/7>, page 90

**Fig. 4.2** Variables affecting the environmental literacy. Each variable interacts with one another (adapted and modified from Hungerford and Tomera (1985); Hungerford and Volk (1990); Hungerford et al. (1990))



**Figure 9** Variables that influence environmental literacy  
(Source: Fang et.al (2023:96))

The low level of environmental literacy can affect the awareness of the community. Basically, environmental literacy can be influenced by several variables as listed in the figure. Meanwhile, public awareness is a key factor in the successful implementation of environmental policies.<sup>28</sup> The low level of public understanding of spatial regulations and coastal boundary protection in Sendangmulyo Village is one of the main obstacles in the implementation of the Rembang Regency RTRW Regional Regulation for 2023-2043.

Based on an interview with Mashudi, as the Village Consultative Body of Sendangmulyo, on January 10, 2025, most residents in Sendangmulyo Village do not understand that the coastal boundary area has ecological functions that must be maintained and protected from development activities. Mashudi stated:

"Most people here don't know that the coastal zone must be protected. They think this land can be used for building houses or businesses, without knowing that it can increase the risk of disaster."

<sup>28</sup> Fang, Hassan, and Lepage, *The Living Environmental Education: Sound Science Toward a Cleaner, Safer, and Healthier Future* . , page 96



People tend to consider coastal borders as free land that can be utilized for economic and residential purposes, without realizing that development in these areas can increase disaster risks and purposes damage the balance of coastal ecosystems.

According to Natural Resource Management Theory (Hardin, 1968), common-pool resources such as coastal areas will be overexploited if they are not managed properly and if the community does not have a collective awareness to protect them.<sup>29</sup> In the case of Sendangmulyo Village, the low environmental awareness of the community leads to the uncontrolled utilization of the coastal boundary, which causes:

1. Changing the ecological function of the coastal boundary, which should be a conservation area, into settlements and business areas;
2. Increased risk of natural disasters, such as abrasion and tidal flooding, due to loss of natural vegetation that acts as a wave barrier;
3. Decreased environmental quality, due to poorly managed domestic waste that pollutes coastal waters.

Based on the results of observations and interviews with Anik Kristiana, ST, MM, as a Junior Expert in Environmental Impact Control of the Rembang Regency Environmental Agency on January 15, 2025, the education program carried out by the Rembang Regency Environmental Agency is still sporadic and has not reached all levels of society. She explained:

"The current education program is still limited and has not effectively reached all circles. Socialization on spatial regulations and coastal protection has been carried out, but not thoroughly enough. In fact, in Sendangmulyo Village, there has never been

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<sup>29</sup> Hardin, "The Tragedy of the Commons Garrett Hardin."

any socialization on spatial regulations governing coastal boundary areas."

Lack of socialization on spatial regulations and the importance of coastal protection has caused the community to continue building in the coastal boundary area without considering the impacts.

From the perspective of Environmental Law Theory, according to Birnie, Boyle, and Redgwell (2021), the effectiveness of environmental regulations depends not only on legal supervision and sanctions, but also on public legal awareness. In this context, the lack of public understanding of spatial regulations in coastal areas leads to low levels of compliance with applicable regulations.<sup>30</sup>

Based on an interview with Tasrikah, as Sendangmulyo Village Administration Staff, on 10 January 2025, many residents in Sendangmulyo Village do not know the laws and regulations related to coastal boundaries. Tasrikah explained,

"Many residents do not know about the rules governing coastal boundaries. In fact, some of them claim to have never received socialization about the restrictions and prohibitions on development in the area."

This indicates a large information gap, where the community does not have an adequate understanding of the importance of maintaining the coastal boundary. Without a clear understanding of the applicable regulations residents, tend to regard the area as free land that can be used for development. This reinforces the need for a more intensive and comprehensive socialization program, so that the community has full awareness of the importance of maintaining the coastal boundary area in accordance with existing regulations.

Furthermore, this low level of legal awareness is also caused by the following factors:

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<sup>30</sup> Birnie, Boyle, and Redgwell, *International Law & The Environment* .

1. Lack of socialization and legal education. Based on interviews with the Environmental Agency, education programs related to spatial planning and coastal protection are not conducted regularly. Many people do not understand the legal consequences of illegal development in coastal boundary areas.
2. Relatively low level of education. The majority of Sendangmulyo Village residents work as fishermen and small traders, with relatively low levels of education. Education level has a significant effect on environmental awareness. The higher the level of education, the greater the understanding of the importance of maintaining coastal ecosystems.<sup>31</sup>
3. Economic factors are a top priority. Most residents depend on economic activities around the coast, such as fishing and trading. This causes them to focus more on meeting short-term economic needs, rather than considering long-term impacts on the environment. The study by Tekat et al. (2023) shows that coastal communities are often more concerned with economic sustainability than environmental sustainability, unless there are economic incentives linked to conservation efforts.<sup>32</sup>

**c. Weak Coordination Between Related Parties in the Implementation of the Rembang Regency RTRW Regional Regulation 2023-2043**

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<sup>31</sup> Devina Arninda and Evi Gravitariani, "Assessing Coastal Environmental Conservation, Literature Study Using Circular Economy and Choice Modeling Approach," *Journal of Environmental Science* 19, no. 3 (2021): 511–16, <https://doi.org/10.14710/jil.19.3.511-516>, page 512

<sup>32</sup> Tekat Sukomardojo et al., "Encouraging Environmental Conservation Behavior in Coastal Communities: Lessons from Community-Based Initiatives," *Jurnal Abdimas Peradaban* 4, no. 2 (2023): 22–31, <https://doi.org/10.54783/ap.v4i2.25>, page 28

Coordination is a key aspect in the successful implementation of environmental and spatial policies. In the context of coastal boundary management in Sendangmulyo Village, weak coordination between government agencies and related parties is a significant obstacle in enforcing regulations.

Based on the results of an interview conducted on January 14, 2025 with Moh. Nur Aziz, SE, MT, M.Eng as Head of the Spatial Planning Division of DPUTRU Rembang Regency, stated:

"We face a big challenge in terms of coordination between various parties. The disagreement between the local government, Satpol PP, and village officials often hampers law enforcement against spatial violations. Without a clear mechanism, the process of monitoring and prosecuting illegal development in the coastal zone is ineffective and slow.

This Head of Spatial Planning statement from the highlights a serious problem in the implementation of the Regional Regulation on RTRW in Rembang Regency for 2023-2043. Lack of clarity in coordination mechanisms can lead to confusion and conflict between parties that should be working together. This not only hampers law enforcement, but also has the potential to damage the environment and threaten the sustainability of development. Concrete steps are needed to improve communication and collaboration between agencies so that spatial supervision can be carried out effectively.

In Natural Resource Management Theory, Hardin (1968) mentions that management of shared resources requires good coordination among stakeholders to avoid overexploitation and conflicts of interest.<sup>33</sup> Poor coordination in coastal boundary management can lead to:

1. Overlapping policies between different agencies, resulting in inconsistent implementation of rules.

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<sup>33</sup> Hardin, "The Tragedy of the Commons Garrett Hardin."

2. The lack of community involvement in coastal resource management is due to the government's lack of effective communication and coordination strategies with local residents.
3. Weak legal action against spatial planning violations, due to the absence of an integrated reporting and enforcement system.

Riduan's study (2024) shows that effective coordination between the local government, related agencies, and the community can improve the success of environmental policy implementation.<sup>34</sup> However, in the case of Sendangmulyo Village, the absence of a systematic coordination mechanism has caused the coastal boundary protection efforts to not run optimally. Therefore, to avoid conflicts of interest in the management and utilization of agrarian resources, the government as the executor of state power has a role in accordance with its power to regulate the management and utilization of agrarian resources in order to achieve the greatest public welfare.<sup>35</sup>

From an Environmental Law Theory perspective, weak coordination can lead to ineffective law enforcement and regulatory implementation. According to Birnie, Boyle, and Redgwell (2021), environmental law must be supported by a strong coordination mechanism between stakeholders, as the environment is an entity that is influenced by various factors and interrelated interests.<sup>36</sup>

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<sup>34</sup> Akhmad Riduan, "Challenges and Opportunities in the Implementation of Environmental Policies in Local Government," *Bulletin of Community Engagement* 4, no. 1 (2024): 232–37, <https://attractivejournal.com/index.php/bce/article/download/1091/920/8466>, page 233

<sup>35</sup> A Ramli et al., "The Nature of Justice to Implement the Nationality Principle in the Agrarian Law," *JL Pol'y & Globalization* 46 (2016): 254–55, [https://heinonline.org/hol-cgi-bin/get\\_pdf.cgi?handle=hein.journals/jawpglob46&section=11%0Ahttps://www.academia.edu/download/88532014/234650517.pdf](https://heinonline.org/hol-cgi-bin/get_pdf.cgi?handle=hein.journals/jawpglob46&section=11%0Ahttps://www.academia.edu/download/88532014/234650517.pdf).

<sup>36</sup> Birnie, Boyle, and Redgwell, *International Law & The Environment*.

However, observations and interviews show that inter-agency coordination in coastal boundary management in Sendangmulyo Village is still very weak, which is reflected in the following aspects:

1. Lack of Synergy between Satpol PP, Spatial Planning Office, and Village Officials. Satpol PP is tasked with enforcing regulations, but is often slow in taking action due to a lack of communication with the Spatial Planning Office which has data and spatial policies.
2. Village officials, who play a direct role in the field, often do not receive clear technical guidance in dealing with spatial violations in coastal boundaries. As a result, illegal development continues without any firm intervention.
3. Lack of Integrated Data on Land Ownership Status and Spatial Violations. Many residents have built houses on the coastal boundary without clear ownership documents, making it difficult for the government to determine appropriate legal action. The Spatial Planning Office and village officials do not have an integrated information system that can be used to monitor spatial changes and land ownership status in real-time. This result in law enforcement often being reactive rather than preventive.
4. Lack of Joint Supervision Mechanism. Supervision of development in the coastal boundary area is not done in a coordinated manner, so there are often cases where one agency is unaware of actions taken by another agency. For example, in some cases, the Environment Agency only became aware of violations after houses had already been built, making prevention efforts difficult.

Siahaya et.al (2025) state that poor coordination between agencies is often caused by overlapping authority and lack of effective



communication.<sup>37</sup> If not immediately corrected, this will further exacerbate damage to the coastal environment and weaken the effectiveness of enforcement of the Rembang Regency RTRW Regional Regulation for 2023-2043.

The implementation of the Rembang Regency RTRW Regulation 2023-2043 in Sendangmulyo Village faces complex obstacles, including lack of supervision, lack of public awareness, and weak coordination between related parties. The lack of supervision and law enforcement has led to widespread spatial violations. On the other hand, low public awareness worsens environmental conditions and hampers efforts to protect coastal boundaries. Weak coordination between agencies slows down the process of handling violations and implementing policies.

## Conclusion

Settlement development on the coastal boundary of Sendangmulyo Village has had a significant negative impact on the coastal environment. The results show that this development causes damage to coastal ecosystems, such as loss of natural vegetation and increased risk of abrasion and tidal flooding. In addition, the loss of the ecological function of the coastal fringe area as a natural protection zone further increases the potential for damage from large waves. In line with the research results, the impact of settlement development is not only limited to environmental aspects, but also has significant socioeconomic implications. This development triggers conflicts between economic interests and

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<sup>37</sup> Vogel Victory Siahaya et al., "Barriers to Inter-Agency Coordination in Immigration Law Enforcement in Bitung City : Challenges and Steps for Improvement," *Iuris Studia Journal of Legal Studies* 5, no. 3 (2025): 813–25, <https://jurnal.bundamediaгруп.co.id/index.php/iuris/article/download/745/505>. , page 819

environmental preservation, and reveals the low level of public awareness of the importance of coastal ecosystem protection. The reduction in fishermen's catches not only affects the sustainability of marine resources, but also reduces the income and economic welfare of fishing families. On the other hand, land use change and increased disaster risk also affect social stability and change the pattern of life of coastal communities.

In the implementation of the Rembang Regency Regional RTRW Regulation 2023-2043 related to coastal zone protection in Sendangmulyo Village, there are three main obstacles: lack of supervision due to limited human resources and budget, lack of public awareness about the importance of coastal zone protection, and weak coordination between related agencies. These constraints hinder the effectiveness of policy implementation and management of the riparian area. To improve riparian protection, an integrated approach involving the government, communities and other related parties is needed. Supervision can be strengthened through technology, such as drone-based monitoring or geographic information systems (GIS), for real-time detection of violations. Environmental education programs should also be expanded to involve communities in mangrove restoration and waste management initiatives. Inter-agency coordination can be strengthened by establishing regular communication forums, and capacity building of village officials and communities to understand RTRW policies is also crucial to encourage their active involvement in safeguarding coastal areas.

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## DECLARATION OF CONFLICTING INTERESTS

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