Public Sphere Review
Journal of Public Administration

Vol. 4 No. 2 September (2025) Page: 127-135
Available *online* at: http://psr.hangtuah.ac.id

Bureaucratic Dynamics in Environmental Management in the Coastal Area of Rembang Regency

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DOI: https://doi.org/10.30649/psr.v4i2.174

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KEYWORDS

Environmental Management; Coastal Areas; Supervision; Bureaucratic Reform.

ABSTRACT

This study explores how strengthening the supervisory function within the framework of bureaucratic reform influences the effectiveness of environmental management in the coastal zone of Rembang Regency. Coastal areas in Rembang face fundamental challenges, including severe abrasion, waste-induced pollution, and spatial conflicts, which necessitate comprehensive and coordinated supervision efforts. A qualitative case study approach was employed, with data collected through observation, focus group discussions (FGDs), and in-depth interviews. Data analysis followed Creswell's thematic analysis framework, complemented by VOSviewer bibliometric mapping to identify research trends related to coastal management and bureaucratic reform. The findings reveal that adequate supervision in addressing coastal environmental issues requires multi-actor collaboration among government agencies, local communities, and non-governmental organizations. Such cooperation is essential due to local governments' limited resources and authority. Moreover, active community participation is vital in ensuring sustainable coastal development.

INTRODUCTION

One of the areas of change in the bureaucratic reform agenda that is the focus of the government's attention is strengthening the supervisory system. Bureaucratic reform is an effort made by the government to improve administrative performance through various means aimed at creating effectiveness (Yustia & Arifin, 2023). In addition, bureaucratic reform is not only related to increasing efficiency and improving administration, but also aims to maintain government legitimacy in the eyes of the public (Bolkvadze, 2017). In the public administration literature, supervision is defined as managing, controlling, or inspecting (Hoge et al., 2011).

In the context of coastal tourism governance in Rembang Regency, the supervision system is a vital element, considering that the tourism sector has side effects in the form of environmental degradation due to the disposal of waste by industrial actors that are not well

managed, massive abrasion that results in the loss of some land, and waste management that has not been coordinated systematically. Coastal areas, if handled properly, will develop into a substantial economic sector and become an essential part of tourism at large. Seaside tourism is an integral part of the world economy and facilitates access to "blue spaces" that are useful for maintaining ecological and community quality of life (Jarratt & Davies, 2020). According to the World Tourism Cities Federation's 2020 report on global tourism economic trends, the top 20 countries in terms of overall tourism revenue are 18 countries with coastlines. These countries collectively account for about 70% of global tourism revenue (Wakil, 2024). Apart from the economic side, tourism in coastal areas also introduces the side of local identity and tradition (Ciacci et al., 2023).

Rembang Regency has a coastal area that stretches from Kaliori Subdistrict to Sarang Subdistrict. Due to this geographical condition, the local government has the duty and function to control pollution and environmental damage. This pollution can be physical, chemical, or biological, so it will disrupt the life of the surrounding biota, which in turn causes losses and health problems (Tosepu et al., 2025). One of the indicators used is the Environmental Quality Index, which has three parameters: water quality, air quality, and land cover. Supervising and controlling environmental issues is a heavy task carried out by the Environmental Agency (DLH) of Rembang Regency.

Their first step was to plan and supervise the licensing of companies, especially micro fish processing companies that have dominated businesses in the coastal areas of Rembang. The government supervises waste management by issuing recommendations for technical approval for wastewater discharge and technical details of B3 (hazardous and toxic materials). In addition, through the DLH of Rembang Regency, the government also requires companies to have an Environmental Permit (*Perling*). This ensures that waste from fish processing companies in coastal areas can be appropriately managed. That waste discharge into the sea is carried out according to regulations, including the obligation to test waste before discharging it. Poorly managed industrial waste will be carried by rivers into the sea, settling on the seabed and staying there for a long time (Abirami, 2024).

The next problem is related to the massive abrasion in the Rembang Regency's coastal areas. Coastal abrasion disasters in Indonesia continue to increase from time to time. Coastal abrasion in Indonesia occurs in an area of 1,888,085 Ha with 4,917,327 people exposed (Haryani et al., 2019). In terms of natural conditions, the beach in Rembang has an annual cycle that affects the condition of the sand, including the phenomenon of abrasion. In the last 10 years, abrasion has been quite severe, mainly due to the influence of waves known as "*baratan timuran*". The characteristics of the eastern coast of Rembang are very vulnerable to abrasion, with a total loss of coastal land reaching around 800 hectares. One of them is Caruban Beach, which has been affected by abrasion. Another beach that can potentially be affected by abrasion is Pasir Putih Beach in Wates. The traders are placed in locations determined by the manager not to be affected by massive abrasion.

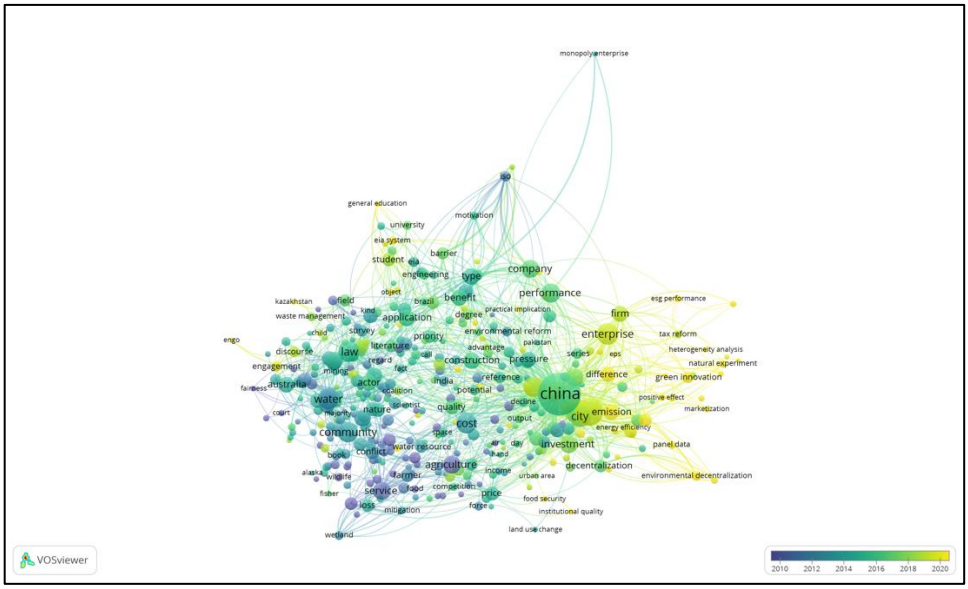

Figure 1. Bibliometric Visualization of Environmental Management Reform
Source: Researcher Data Analysis (2025)

Based on the Scopus data that researchers analyzed using the Vos Viewer tool, 942 documents discuss the reform agenda in the context of environmental management. In 2020, this topic experienced a trend, leading to ecological reform characterized by energy efficiency, decarbonization, climate action, environmental decentralization, and natural experiments. Studies on bureaucratic reform in ecological management have developed rapidly in various countries, especially in Asia and Latin America. In China, bureaucratic reform is often associated with evaluating the performance of public and private institutions in reducing emissions and encouraging green investment through decentralization and green innovation approaches. Meanwhile, studies in India and Pakistan have highlighted the linkages between institutional reforms, infrastructure development projects, and environmental management challenges at the urban and rural levels. Countries such as Brazil emphasize the role of academia and campus engagement in the Environmental Impact Assessment (EIA) system. At the same time, Australia and Kazakhstan focus on environmental justice, the involvement of local actors, and conflict dynamics in natural resource governance.

However, literature examining how strengthening the supervisory function in the context of bureaucratic reform impacts the effectiveness of environmental management at the district or city level in Indonesia, especially in coastal areas, is still very limited. Most studies of bureaucratic reform in Indonesia emphasize administrative efficiency and public services, not environmental monitoring. In fact, in coastal areas such as Rembang Regency, real challenges such as abrasion, pollution, and spatial tourism conflicts require strong and adaptive supervisory capacity. Therefore, this research seeks to fill this gap by investigating the dynamics of strengthening oversight in local bureaucratic reform as part of an environmental management strategy in coastal tourism areas.

RESEARCH METHODS

This research employed a qualitative approach using a case study design. The study was conducted in the coastal tourism area of Rembang Regency, encompassing Pasir Putih Wates

Beach, Karang Jahe Beach, Caruban Beach, and Layur Indah Beach. These sites were selected because they share similar potentials and environmental challenges, particularly coastal abrasion and pollution caused by fish-processing industries.

A qualitative approach allows the development of reciprocal patterns among emerging categories (Suchan & Brewer, 2000), enabling an in-depth exploration of bureaucratic dynamics in the environmental supervision system within coastal management. Data were collected through observation, focus group discussions (FGDs), and in-depth interviews to obtain comprehensive insights from multiple perspectives.

Informants included representatives from the Environmental Agency (DLH) of Rembang Regency, the Regional Development Planning Agency (Bappeda), the Culture and Tourism Agency, community members from Gedongmulyo, Punjulharjo, and Wates Villages, as well as local MSME actors. Data analysis followed Creswell's (2014) thematic analysis framework, which emphasizes identifying and interpreting key patterns in qualitative data. In addition, VOSviewer was utilized to perform bibliometric mapping, enabling the researcher to identify emerging trends and research directions related to bureaucratic reform and coastal environmental management.

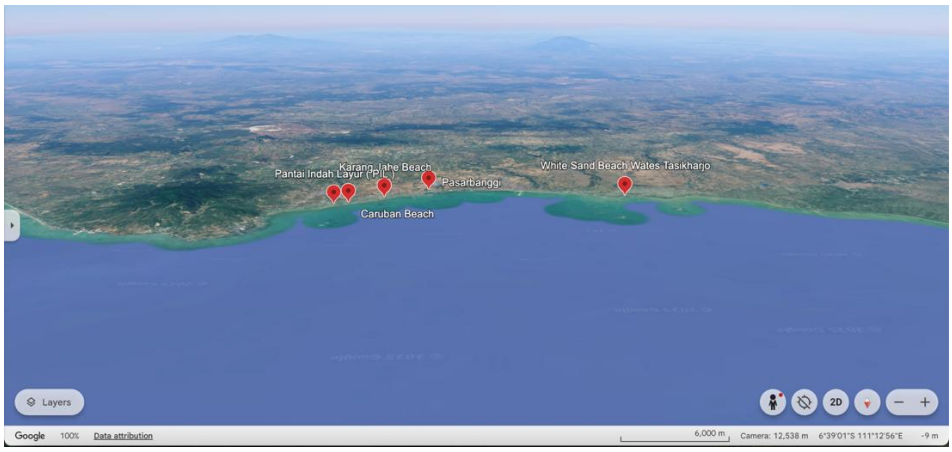

Figure 2. Coastal Area of Rembang Regency
Source: Author's compilation using Google Earth (2025)

RESULT AND DISCUSSION

Bureaucratic Dynamics in Coastal Environmental Monitoring

Environmental pollution problems in the coastal areas of Rembang Regency require the involvement of multi-actor roles and cooperation. This is due to the limited authority possessed by the district government. Strengthening supervision is one of the activities that must be carried out in bureaucracy so that activities can achieve predetermined targets (Herbasuki, 2015). For example, for the problem of sea water pollution, DLH Rembang Regency collaborates with DLH Central Java Province because the district authority is only in the upstream and downstream areas. Collaborative governance is an effort to address public issues and solve problems (Nafi'ah, 2020).

Regarding integrated coastal management policies, the district government has limited authority. However, DLH still supports conservation efforts by providing plant seeds for non-governmental organizations that want to plant. However, no specific budget has been

allocated for this program. This often raises expectations from the community, who consider DLH the leading provider of plant seeds. This was conveyed by the Head of the Pollution and Environmental Damage Control Division of DLH Rembang Regency, who stated:

> "*Our current role is more focused on providing technical assistance and conducting socialization and education on waste management to tourism players in the coastal area. But we have limited authority for the overall management of coastal areas.*"

When it was still under the regency's authority, the Rembang Regency Government, through the Marine and Fisheries Service, had various strategic programs in coastal management, including planting cypress to overcome abrasion. This program even pioneered the planting of cypress. The coastal management regulation initially emerged as a response to the issue of coral reef destruction that occurred due to fishing by bombing. Oversight of coral reefs is under the authority of the provincial Conservation Center. Rembang has a large area of mangrove vegetation, reaching around 100 hectares. The Essential Ecosystem Area or KEE in Pasar Banggi, the oldest mangrove area in Rembang, covers an area of approximately 54 hectares based on the KEE decree, with the potential to expand to 60 hectares. The program has received positive support from the community, especially those who own ponds in areas affected by abrasion, as they have directly benefited from the mangroves.

Replicating Mangrove Conservation for Sustainable Coastal Livelihoods

The government has tried replicating the mangrove conservation program in other areas in Rembang. The conservation concept goes hand in hand with economic development, where the primary focus is to secure community ponds and bring economic benefits through tourist visits. It also encourages positive interventions from various parties, both the government and the private sector. Currently, the KEE status is under the supervision of the Natural Resources Conservation Center. DLH develops two main plant species in coastal conservation efforts: cypress for coastal forest areas and mangroves for tidal zones. The concentration of development is mainly in the western part of Rembang. The selection of these plant species is adapted to the characteristics of sandy areas, and the results can be seen with a total area that now reaches 100 hectares. The development of the coastal forest began with the planting of cypress at Caruban Beach, although the area is currently facing the threat of abrasion. This was conveyed by the Head of the Pollution and Environmental Damage Control Division of DLH Rembang Regency, who stated:

> *"In 2010, we messed around 1,500 fir trees in Karang Jahe Punjulharjo, which has now developed into Rembang's flagship tourist destination. This program results from collaboration between various stakeholders, including NGOs, TNI-Polri, the community, and support from the government and the private sector.*"

Before the authority was transferred to the province, Pasar Banggi was designated a conservation area. DLH initiated the development of this area with a focus on directly benefiting the community. This was triggered by several cases of mangrove land conversion into ponds. In 2013, DLH started the construction of a 30-meter tourist track, which later expanded to almost 50 meters. Impressively, within 12 years (2013-2025), the thickness of mangroves in this area increased significantly from less than 100 meters to almost 300 meters

towards the sea, with an addition of about 200 meters. Local communities are also given space to submit complaints on pollution cases through various channels owned by the local government, either through the district portal or social media such as Facebook and Instagram. Community complaint efforts aim to improve activities that have been lacking (Sabeni & Setiamandani, 2020). Complaints from the community will then be followed up on by DLH through a special team so that complaints can be responded to quickly. The incoming problems are not only related to industrial waste, but also the problem of waste in coastal areas generated from tourism activities.

Environmental Pollution due to Waste Discharge from Industrial Activities

The tourism and industrial sectors have contradictory characteristics, mainly due to industrial waste that can damage the aesthetics of tourist destinations. Local industries are interested in meeting the needs of the tourism industry (Abuelsoud Mohmmed, 2021). Holistic supervision efforts are needed so industry players do not dispose of processed waste directly into nature. In the context of Rembang Regency, most industries in the coastal area are micro fish processing industries, where problems arise when they cannot treat waste. In addition, some unscrupulous companies also dispose of waste through hidden pipes buried underground and operated at night. The waste problem is also more complex when a high cost is required to treat the waste production, which is about 25 percent of the company's operational costs.

The relatively expensive investment and operating costs of sewage treatment are often used as a reason by entrepreneurs not to build sewage treatment plants (Mashudi Gani et al., 2023). In dealing with this problem, the Environmental Agency or DLH of Rembang Regency also coordinated with the Ministry of Maritime Affairs and Fisheries (KKP) regarding coastal pollution. Efforts are made to ensure that companies operate by applicable standards. Waste disposal without prior treatment will cause eutrophication or over-fertilization of waters. Mr. Taufiq Damarmawan conveyed this as the Head of the Pollution and Environmental Damage Control Division of DLH Rembang Regency, who stated:

> "*Fatty waste from the fish processing industry, if discharged to the beach without meeting quality standards, can cause eutrophication. This results in an explosion of plankton, which then die and form mud that causes an unpleasant odor.*"

Currently, wastewater treatment plants (WWTPs) are only available for the batik industry in Lasem District, Rembang Regency. Meanwhile, several micro-businesses that have the potential to produce waste, such as the pemindangan, smoking, and fish boiling industries, do not yet have similar WWTP facilities. Production water is still often discharged directly by MSME actors into the seas. In this context, stricter supervision efforts involving multi-stakeholder cooperation are needed. The government, through DLH, does not provide WWTP to every industry but provides intensive assistance. Every company that has B3 waste technical approval will be required to have waste management facilities. Waste must be tested at the inlet (entering the WWTP) and outlet (leaving the WWTP), especially for medium and large-scale companies. Companies must submit UKL-UPL (Environmental Management

Efforts and Environmental Monitoring Efforts) reports every 6 months and test results to DLH.

Massive Abrasion in the Coastal Area of Rembang Regency

Efforts to overcome the problem of abrasion in coastal areas in Rembang Regency continue to be encouraged by the local government. Coastal abrasion is a form of imbalance in the interaction between oceanographic and geological factors in coastal areas (Yazalia et al., 2020). Geographically, not all coastal areas are suitable for mangrove planting. In 2012, the Central Java provincial government built a wave barrier in the Bonang area, Lasem District, for coastal areas that have difficulty planting mangroves; technical handling in the form of infrastructure is needed. Although infrastructure has a limited lifespan, conservation efforts have continued through vegetation planting since 2014, and the results have begun to show. Treatment costs are high, but this is necessary to protect community assets.

To overcome abrasion problems, it is essential to start coastal management planning (Rostika et al., 2016).. One policy that has been implemented is the formation of Tourism Awareness Groups (*Pokdarwis*) and Regional Mangrove Working Groups (KKMD). Although the authority is now at the center, districts are still asked to reactivate these groups that previously existed when they were still under district authority. After the Job Creation Law transition, these group meetings were inactive, but are now starting to be reactivated. One example of a policy that has been made is the existence of a village regulation on saving and protecting mangroves.

The construction of docks also significantly impacts the direction of ocean currents, with an influence that can reach 7 - 10 times the length of the reclamation made. In the Sluke area near the PLTU to the east, the abrasion is so severe that it affects residential areas. In the Tasikharjo area, the accretion phenomenon is beneficial for pond development. However, some people convert mangrove areas that have grown by moving them to the north to become ponds. This community participation is a form of effort and response to changes in the community (Obot et al., 2022).. The Wates area is still maintained because of the manager's self-help initiative, which created a wave barrier. The tourism managers utilize the concrete of the former Pantura road as a wave breaker to protect the tourism area. In socialization, the agency always emphasizes the importance of thinking about tourism results and sustainability.

Large companies such as power plants and cement factories are also actively supporting conservation efforts in their areas and the surrounding areas. They undertake various initiatives such as creating three-legged structures for wave protection, mangrove nursery programs, planting perennials and ornamental plants, and conservation of coral reefs. Despite having permits to discharge effluent into the sea, these companies treat their effluent through a treatment pond system. The cement plants also regularly organize planting events and conduct conservation efforts in their internal areas.

CONCLUSION

The complexity of environmental problems in the coastal areas of Rembang Regency, such as severe abrasion and pollution, necessitates comprehensive and collaborative monitoring

efforts. Adequate coastal supervision cannot rely solely on the local government, whose authority and resources remain limited. Therefore, involving non-governmental actors, including local communities and the private sector, is crucial to ensure sustainable environmental governance. Community initiatives, such as those in Lasem Sub-district, where residents install stone barriers as a precursor to vegetation planting, illustrate the emergence of local adaptive capacity. Nevertheless, these initiatives still face natural constraints, including strong waves and ongoing erosion, which require technical and institutional support.

Beyond its ecological importance, the coastal zone also holds significant economic potential through tourism development. If managed inclusively, the tourism sector can generate regional income and create a trickle-down effect that benefits local communities. Thus, strengthening multi-actor collaboration and aligning environmental supervision with sustainable economic planning are key to achieving resilient coastal management in Rembang Regency.

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