

A Historical Analysis of Environmental Improvement Policies in the Coastal Areas of the Pekalongan Residency During the Dutch Colonial Period

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ABSTRACT

The coastal region of the Pekalongan Residency constituted a strategic area within the transportation and industrial network of the Dutch East Indies. In the early twentieth century, modern factories operated in this region and were integrated with transportation infrastructures such as railway lines and the Pantura (North Coast) highway. Despite these developments, the coastal areas of the Pekalongan Residency experienced significant environmental problems, which prompted the colonial government to implement various policies aimed at mitigating environmental degradation. However, from a historical perspective, these environmental issues have received relatively limited scholarly attention. Addressing this gap, the present study aims to analyze environmental improvement policies in the coastal areas of the Pekalongan Residency during the Dutch colonial period. This research employs the historical method combined with a political ecology approach. Primary sources include official government publications, newspaper reports, and colonial-era maps. The findings indicate that the coastal environmental landscape of the Pekalongan Residency played a crucial role in supporting the economic activities of coastal communities. Nevertheless, intensive industrial activities contributed to environmental degradation, which in turn affected multiple aspects of social and economic life. In response, the colonial government periodically introduced environmental improvement policies, both preventive and corrective in nature. Overall, these measures were not fully effective, largely due to the exploitative character of the colonial system.

INTRODUCTION

Environmental issues had already attracted the attention of both the government and society in the Pekalongan Residency during the Dutch colonial period, particularly in the early 20th century. Nevertheless, historical studies focusing on environmental history in the Pekalongan Residency remain very limited. Consequently, many historical facts remain undiscovered and have not been disseminated to a broader audience. This also reflects the relatively limited attention historians have given to environmental

history as a field of study. Therefore, it is essential to further examine environmental history in the Pekalongan Residency, especially during the Dutch colonial period.

More broadly, environmental issues have recently gained public attention because environmental degradation severely threatens human life. Over the past two years, flood disasters across Indonesia have reached alarming levels. These disasters have caused not only material losses but also casualties. Meanwhile, existing studies in environmental history remain geographically uneven and

concentrated in particular regions. For instance, [Nawiyanto \(2018\)](#) examined the history of pollution in the Brantas River and the policies implemented to address it; [Husain \(2020\)](#) analyzed the history of flooding in Surabaya during the second half of the twentieth century; [Warto \(2009\)](#) discussed forest exploitation in the Rembang Residency during the Dutch colonial period; [Utomo \(2021\)](#) investigated the history of flooding in Pemalang in the early twentieth century; and [Rahardjo & Itawan \(2025\)](#) explored conservation discourse behind the establishment of the earliest conservation areas in colonial Kalimantan.

Other literature also adopts a broader spatial and thematic scope within environmental history, such as [Boomgaard and Aso's \(2025\)](#) article, which critically examines Southeast Asia's historical trajectory through an ecological lens. Although Southeast Asians remain minor contributors to climate change and the broader Anthropocene, land-use changes, particularly deforestation and peatland degradation associated with agricultural expansion in Indonesia, drive the region's carbon footprint. Furthermore, the edited volume by [Sangwan et al. \(1998\)](#) offers a foundational account of South and Southeast Asia's environmental history, spanning a broad geographical range from Peshawar to the Maluku Islands. Their work systematically examines key historical themes across pre-colonial and colonial eras, highlighting the ecological impacts of colonialism, colonial forestry, and diverse socio-environmental dynamics, from indigenous resource management to industrial resource extraction.

These studies examined environmental problems across regions, focusing on both the Dutch colonial period and the Republic of Indonesia era. However, substantively, none of them specifically emphasised environmental improvement policies in the Pekalongan Residency during the Dutch colonial period. This absence creates the impression that the Pekalongan Residency has received little attention from historians and has been largely overlooked within environmental history discourse. In

fact, a closer examination reveals that the Pekalongan Residency was a significant region during the colonial era ([Widodo, 2005](#); [Wasino & Hartatik, 2017](#)). It was recognised as a major centre of the sugar industry in the Dutch East Indies and was well integrated into transportation networks, including railway lines and the North Coast (Pantura) highway. Its coastal location also makes it susceptible to natural disasters ([Widayanti & Insiani, 2021](#)).

Industrialisation during the Dutch colonial period, particularly in the early twentieth century, exhibited a fluctuating pattern ([Utomo & Wijayanti, 2025](#)). It grew during the first two decades, then declined in the third and fourth decades due to the global economic crisis. However, it also created critical environmental problems that warrant further investigation in the context of the Pekalongan Residency, particularly how the colonial government responded to these challenges. Examining government efforts to address environmental issues in this region is essential, as the state was the primary authority responsible for managing problems within its colonial territories.

Building on this background and the identified research gap, this research aims to examine and analyse government policies on environmental improvement in the coastal areas of the Pekalongan Residency. The analysis is conducted from a historical perspective, given that the period under study falls within the Dutch colonial era. To achieve the research objectives, this research focuses on four main aspects: (1) exploring the geographical and demographic setting to understand the conditions of the Pekalongan Residency; (2) analysing the relationship between industrialisation and environmental degradation; (3) examining the environmental impacts of industrialisation; and (4) evaluating government policies as responses to environmental problems in the Pekalongan Residency. Studies on government policies regarding environmental improvement in the Pekalongan Residency during the Dutch colonial period remain remarkably limited. This study aims to fill this gap and demonstrate the colonial government's role

in shaping environmental and disaster management policy.

RESEARCH METHODS

This research employed the historical research method. Systematically, the historical method consists of four stages: heuristics, source criticism, interpretation, and historiography. Heuristics refers to the process of identifying and collecting research sources, which are classified into primary and secondary sources (Gottschalk, 2021). Primary sources constituted the main references for this research and included official government publications, newspaper reports, maps, and photographs. Secondary sources, by contrast, came from non-contemporary actors and had undergone prior interpretation. These included scholarly articles and books relevant to the research topic.

This study used primary sources, including official colonial-era reports that outline policies implemented by the colonial administration. These policies facilitated the expansion of capitalism by granting land-clearing rights for plantations, corporate operating licenses, and special privileges for European residents living and working in the Dutch East Indies. Additionally, these official reports provide quantitative data regarding the expansion of sugarcane cultivation areas and the establishment of new commercial enterprises. In contrast, historical newspapers offer more nuanced, micro-level factual insights, such as accounts of localised flood disasters that inundated the Pekalongan Residency.

These primary materials were gathered through offline heuristic searches at the Central Java Provincial Library and Archives Service and Universitas Diponegoro Library, as well as online archival databases providing historical documents, such as *delpher.nl*. Nevertheless, locating primary sources directly on ecological policies and their local impacts in the Pekalongan Residency proved challenging. Consequently, a rigorous heuristic process was used to trace scarce archival materials, most of which were produced from colonial perspectives.

The collected sources were then examined through source criticism to ensure the credibility and reliability of the data and information. Next, the selected sources were interpreted. In the interpretive phase, this research adopted a political ecology framework that explores the relationship between environmental change and power structures. Environmental change and ecological crises do not occur naturally; rather, they are shaped by dynamics of power, political economy, and human policy interventions (Robbins, 2012). These power dynamics suggest that environmental improvement policies implemented by the Dutch colonial government cannot be separated from complex underlying factors. Accordingly, the political ecology approach is expected to elucidate the relationship between environmental conditions and the colonial state's environmental policies.

The interpretation, formulated as a series of analytical arguments, was then synthesised and presented in the historiographical stage. Historiography is the practice of writing history based on sources and the historian's interpretation (Gottschalk, 2021). Several aspects are emphasised in this stage, including the structure of writing, stylistic coherence, and the chronological synthesis of historical facts (Wasino & Hartatik, 2020). As the final stage of the historical method, historiography plays a crucial role in communicating research findings to a wider audience.

RESULTS AND DISCUSSION

Geographical and Demographic Setting

The northern coastal area of the Pekalongan Residency forms part of the broader northern coast of Java, which stretches from the western tip (Banten) to the eastern end (East Java). The natural characteristics of the northern coast of Java are generally sandy and muddy, extending to the estuaries of rivers (Ali & Sulistiyono, 2021). The coastal region of the Pekalongan Residency exhibits these features, extending geographically from Brebes in the west to Batang in the east. In addition, numerous major river estuaries are found in this region, including those of the Rambut, Comal,

Pemali, Kebuyutan, Kaligung, Sengkarang, and Loji rivers.

The soil in the coastal areas of the Pekalongan Residency is relatively fertile, thereby supporting agricultural and plantation activities. Extensive rice fields are sustained by a well-developed irrigation system, facilitated by major rivers originating from the mountainous regions in the south. Some of these rivers were navigable by large vessels from their estuaries (Siswokartono, 2006; Wasino & Hartatik, 2017). Like other areas along Java's northern coast, the Pekalongan coastal region has a tropical climate characterised by two seasons: the dry season, typically May to October, and the rainy season, from late October to April (Sulistiyono, 2003).

Because of its geography, the coastal region of the Pekalongan Residency held a strategically important economic position. The residency was home to two major second-class ports, namely the Port of Pekalongan and the Port of Tegal (Sulistiyono, 2003). These ports faced the Java Sea and were part of international shipping and trade routes. In addition, large-scale industrial establishments operated within the Pekalongan Residency. These geographical and economic factors significantly shaped the region's demographic composition. The Pekalongan Residency population was ethnically diverse, including Europeans, Chinese, Arabs, and indigenous peoples (Bumiputra). Indigenous people made up the majority, followed by Chinese, Arabs, and Europeans.



Figure 1. Beach in Tegal, Pekalongan Residency, 1930s.
(Source: digitalcollections.universiteitleiden.nl)



Figure 2. Map of the capital of the Pekalongan Residency, published in 1918.
(Source: digitalcollections.universiteitleiden.nl)

According to the 1920 census, the Pekalongan Residency's total population was 2,268,571. This figure consisted of 3,217 Europeans, 22,352 Foreign Orientals, and 2,243,002 indigenous inhabitants (Centraal Bureau voor de Statistiek, 1922). Although Europeans constituted the smallest demographic group in quantitative terms, their influence was considerable. They held strategic positions in the colonial administration and key roles in major companies. This indicates that Europeans possessed not only political power but also access to economically advantageous positions.

Within the Pekalongan Residency, Europeans were primarily concentrated in urban areas and industrial centres. Meanwhile, Foreign Orientals, particularly Chinese and Arab communities, were also concentrated in urban areas and economic hubs. They typically resided in segregated settlements known as Pecinan (Chinese quarters/Chinatown) and Pekojan (Arab quarters). In contrast, the indigenous

population was more widely dispersed and constituted the largest demographic group (Centraal Bureau voor de Statistiek, 1922). Their settlement patterns were largely determined by environmental conditions and economic activities. Theoretically, rapid population growth increases demand for land and public facilities, driving land-use conversion (Bernardi et al., 2026).

Industrialisation and Environmental Degradation

The strategic location of the Pekalongan Residency's coastal areas contributed significantly to the development of the region's industrial sector. In the early twentieth century, the coastal Pekalongan Residency was recognised as one of the largest sugar-producing regions in the Dutch East Indies, with 17 sugar factories in operation. These factories were owned by private enterprises with substantial capital investment. They were established on extensive tracts of land and supported by adequate infrastructure, including railway

systems, health clinics, residential complexes, open fields, sugarcane plantations, irrigation networks, and main processing facilities (Utomo & Wijayanti, 2025; Wasino & Hartatik, 2017; Knight, 1999).

The sugar industry relied on sugarcane (*Saccharum officinarum*) as its primary raw material. In the Pekalongan Residency, sugarcane was cultivated in lowland areas surrounding the sugar factories. As market demand for sugar increased during the first two decades of the twentieth century, companies expanded their plantation areas, as shown in Table 1. Around 1908–1913, two new sugar factories (Sumberharjo, Petarukan, and Banjaratma)

were established (Utomo & Wijayanti, 2025). Local populations cultivated sugarcane plantations on former rice fields, significantly changing land use, as shown in Figure 3. Although sugarcane is a tropical crop that requires substantial water, it can also thrive in relatively dry conditions.

Converting rice fields into sugarcane plantations not only altered land-use patterns but also required irrigation infrastructure to meet rising water demands. From the late nineteenth century to the early twentieth century, sugar companies funded irrigation systems (Wasino & Hartatik, 2017). Among these were weirs and dams built along major rivers, which significantly altered riverine landscapes.

Table 1. The Expansion of Sugarcane Cultivation in the Pekalongan Residency, 1912-1920

Gar Mill Name	Sugarcane Area (ha)								
	1912	1913	1914	1915	1916	1917	1918	1919	1920
Sumberharjo	-	-	710	701	707	730	732	733	736
Petarukan	-	497	1.001	896	1.012	1.013	1.012	516	1.013
Banjaratma	-	639	591	797	852	856	931	568	1.064
Balapulang	641	640	637	642	639	639	639	478	639
Comal	1.228	1.490	1.377	1.575	1.646	1.665	1.668	1.668	1.668
Banjardawa	986	1.064	905	905	879	905	905	834	905
Pangka	515	531	547	752	948	1.043	1.102	865	1.160
Jatibarang	822	886	893	882	1.077	1.227	1.233	905	1.228

(Source: Archief voor de Suikerindustrie in Nederlands-Indie, 1926)



Figure 3. Sugarcane planting in Tegal, Pekalongan Residency, 1890.

(Source: digitalcollections.universiteitleiden.nl)

On a broader scale, sugar factories in the Pekalongan Residency were integrated with railway systems that functioned as the primary mode of transportation and distribution (Utomo & Wijayanti, 2025; Wasino & Hartatik, 2017). Railways were used to transport sugarcane from plantations to factories for processing and to deliver finished products to ports for export. These transport activities were facilitated by the railway network operated by Samarang-Cheribon Stoomtram Maatschappij, N.V. (S.C.S.). At the time, railways were considered a modern mode of transportation

requiring complex infrastructure. Railway lines extended across the coastal region of the Pekalongan Residency, cutting through rice fields and residential areas. Railways and their supporting facilities significantly transformed the region's environmental landscape. In this context, railways should be understood not merely as a means of transportation but also as part of an industrial system, namely, the transportation industry, whose management prioritised material profit. One S.C.S. office was located in Tegal, within the Pekalongan Residency, as shown in Figure 4.



Figure 4. Samarang-Cheribon Stoomtram Maatschappij, N.V. (S.C.S.) Office in Tegal, Pekalongan Residency (Source: digitalcollections.universiteitleiden.nl)

In addition to the sugar-dominated plantation sector, the Pekalongan Residency also had tea, coffee, rubber, and kapok plantations. Several companies operated in this sector, including N.V. Cultuur Mij. Semoegih in tea plantations, N.V. Cultuur Mij. Djolotigo in rubber and tea plantations, N.V. Cultuur Mij. Onderneming Kaligoe in tea and quinine plantations, and N.V. Handel & Landbouw Mij. Kedondong in coffee and cocoa plantations (Wasino & Hartatik, 2017; Utomo & Wijayanti, 2025). These enterprises were predominantly owned by Europeans and were managed

according to capitalist principles, prioritising profit maximisation.

Alongside the plantation sector, forestry enterprises also developed in the region. Timber constituted an important commodity with wide-ranging demand (Afifah, 2020). In the early twentieth century, the Dutch colonial government organised auctions for timber harvested from local forests. Teak was the primary species cultivated in the Pekalongan Residency forests for industrial purposes. In January 1901, a decree granted forest management rights over teak forests in Bantarbolang and Sokawati to Sjiauw Hok, a Chinese Kapitan

in Pekalongan ([Markbericht der Vereeniging voor den Effectenhandel in Nederl. Indie, 20 March 1901](#)). He obtained these rights by paying the colonial government. This arrangement clearly shows that forest resources were managed not for environmental sustainability, but for capitalist exploitation, which in turn contributed to environmental degradation.

Amid these industrial activities, ports served as crucial intermediaries between producers and consumers. Export commodities were distributed not only through the Port of Semarang to the east, but also via the Ports of Pekalongan and Tegal ([Export Naik, 17 September 1937](#)). One of the largest maritime transport companies in the Dutch East Indies was the Koninklijke Paketvaart Maatschappij (KPM), which operated inter-island shipping routes ([Sulistiyono, 2003](#)). However, maritime activities at the Port of Pekalongan faced significant challenges due to environmental degradation, particularly siltation. This process hindered navigation for large vessels, especially during docking. One of the most severe cases of siltation at the Port of Pekalongan occurred in 1933 ([De Haven van Pekalongan, 14 February 1933](#)), rendering docked ships unable to resume navigation. Similar siltation problems were also reported at the Ports of Tegal and Cirebon in 1935 ([De Haven van Cheribon Bederigd, 5 February 1935](#)).

Industrialisation directly contributed to environmental transformation in the Pekalongan Residency. This process can be attributed to three main factors: converting green areas for industrial purposes, environmentally damaging industrial activities, and limited awareness among companies about addressing environmental impacts. Institutionally, industrial expansion was closely linked to colonial government policies, particularly the Agrarische Wet and the Ethical Policy, which facilitated capital investment in the Dutch East Indies. Moreover, the colonial government actively supported industrialisation by developing infrastructure to meet capitalist enterprises'

production and distribution needs ([Daliman, 2012](#)).

Natural Disasters and Their Impacts

The cumulative effects of industrialisation and environmental degradation contributed to natural disasters in the Pekalongan Residency. One of the most evident disasters associated with these processes was flooding ([Utomo et al., 2023](#)). Flooding is a complex phenomenon affected not only by natural factors but also by inadequate infrastructure management and widespread environmental degradation. Along the coastal areas of the Pekalongan Residency, known for their industrial activity, the region was also recognised as highly vulnerable to flooding during the Dutch colonial period.

Numerous newspapers reported flood events that struck the coastal Pekalongan Residency in the early 20th century. The newspaper *Deli Courant* reported that in February 1901, a large-scale flood inundated Pekalongan. The flood submerged railway lines along the coast and resulted in fatalities, as people were swept away by strong currents ([Bandjir, 20 February 1901](#)). Another major flood occurred in March 1902, when heavy rainfall in Brebes, Tegal, and Pemalang caused rivers in these areas to overflow. The Pamali River, one of the region's largest rivers, was among those affected. As a result, rice fields, the main Tegal-Pekalongan road, and railway lines were damaged due to inundation. Several villages and Chinese settlements were also flooded ([Uit de Javasche Courant, 15 Maret 1902](#)).

In this instance, rainfall—alongside land-use changes—was a key factor accelerating flood events, a pattern commonly observed in subsequent flood disasters ([Saputra et al., 2020](#); [Hidayat et al., 2026](#)). High rainfall cannot be effectively absorbed by the soil. Furthermore, a river basin's response to rainfall—manifested as discharge and flow volume—depends on precipitation ([Ismoyojati et al., 2019](#); [Hidayat et al., 2026](#)).

Flooding linked to environmental degradation from industrial activities also destroyed irrigation infrastructure. At the end of 1928, a flood damaged the Gembiro Weir, which was still under construction ([Bandjir slaat een dam w.g. Pekalongan, 2 November 1928](#)). Located in Sragi, Pekalongan, this weir was part of a development project intended, among other purposes, to support the needs of sugarcane plantations associated with sugar factories. In addition, flooding caused severe siltation at the Port of Pekalongan, temporarily halting port activities ([Bandjir-gevolgen, 29 Januari 1923](#)).

Around 1916, flooding inundated parts of Pekalongan, particularly in central areas such as main roads, residential neighbourhoods, and the Niepoth Hotel, thereby disrupting daily activities. In 1934, another flood damaged several electricity-generating machines, causing power outages in Kedungwuni and Wiradesa, as shown in **Figure 5** ([De Overstromingen, 2 February 1934](#)). These events demonstrate that flooding in the coastal areas of the Pekalongan Residency had wide-ranging impacts, affecting not only industrial operations but also the broader population.



Figure 5. Hotel Niepoth in Pekalongan flooded, 1916.
(Source: digitalcollections.universiteitleiden.nl)

Early 20th-century flood disasters inundated transportation infrastructure, including railway networks, and industrial facilities ([Utomo, 2021](#)). This vulnerability was closely linked to environmental degradation from industrial development, which disrupted the natural balance of surrounding ecosystems and increased flood susceptibility. These conditions cannot be

separated from colonial government policies that allowed capitalist enterprises to build extensive industrial infrastructure. Beyond damaging infrastructure, flooding also destroyed agricultural land and disrupted local economic activities ([Utomo, 2021](#)).

The occurrence of natural disasters resulting from environmental degradation caused by industrial activities contrasts with

the views expressed by the Regent of Pemalang, Pandji Ariodinoto. He argued that building and operating new sugar factories improved welfare, infrastructure, and settlement development (van der Mandere, 1927). Similarly, historical research by (Suraiyah & Zamzami, 2024) on industrialization in Probolinggo suggested that industrialization during the colonial period led to advancements in various sectors, including the provision of new educational facilities and improvements in markets and roads. However, these perspectives differ from the present study's findings, which, based on historical sources, indicate that industrialisation in the Pekalongan Residency had predominantly negative environmental consequences. This divergence also highlights the importance of regional context, as industrialisation's outcomes varied across areas.

Environmental Improvement Measures

The Dutch colonial government recognised that environmental degradation and recurrent flooding constituted significant problems with far-reaching economic and social implications. In response, the government introduced a range of policies to address environmental issues, including both infrastructure development and preventive measures. One primary strategy was constructing irrigation channels. The colonial authorities viewed improved irrigation systems, particularly in urban areas, as a way to mitigate frequent flooding. Moreover, these infrastructural developments were also linked to broader sanitation improvements intended to combat malaria outbreaks, which frequently affected the Pekalongan Residency (ANRI, 1977). This policy direction was articulated by the Governor of Central Java, P. J. van Gulik, in 1930.

Infrastructure development programs for irrigation in the urban areas of the Pekalongan Residency continued throughout the 1930s, despite the economic difficulties the Dutch East Indies faced during the global economic depression. Several of these projects were implemented in Tegal and Pemalang during this period. In

addition, efforts were undertaken to clear swamps and fishponds along the coastal areas of the Pekalongan Residency (ANRI, 1977). The construction of irrigation infrastructure, along with the clearing of swamps and fishponds, aimed to improve, particularly by mitigating flooding and controlling malaria outbreaks.

Beyond new construction, the colonial government also improved existing infrastructure in response to environmental degradation. In the early 20th century, the Port of Pekalongan experienced repeated siltation that prevented fully loaded vessels from navigating effectively. In response, the government initiated dredging operations. Under the coordination of the Director of the Port of Semarang, dredging was conducted in stages. However, adverse weather conditions prevented these efforts from proceeding smoothly. Nevertheless, dredging activities continued whenever weather conditions permitted, particularly in areas near the harbour entrance (De Haven van Pekalongan, 14 February 1933). These operations were carried out using specialised equipment, which was routinely transferred between Cheribon, Tegal, and Pekalongan as needed (De Haven van Cheribon Bederigd, 5 February 1935).

. At a broader level, the Dutch colonial government introduced forest management regulations applicable to Java and Madura. The 1913 Boschwezen Reglementen classified forests into two categories: teak forests designated for exploitation and “wild forests” intended for conservation (Afifah, 2020). Subsequently, in the late 1920s, the Boschordonantie voor Java en Madura (1927) was enacted. This regulation governed forest use and imposed stricter limits on community access, ostensibly to protect forest resources from degradation. In practice, however, these justifications were largely normative, as the colonial government continued to grant exploitation permits.

Despite these regulations, forest exploitation in the Pekalongan Residency persisted. As early as 1901, reports indicated that a public tender would be issued for teak forest exploitation in Pemalang for the

period 1901–1907 ([Ministerie van Koloniën, 19 October 1900](#)). Similar tenders were advertised in 1913 in the newspaper *Het Nieuws van den Dag voor Nederlandsch-Indië*, offering rights to exploit the Kedawung forest in the Pekalongan Residency ([Aanbesteding, 12 February 1913](#)). Such public tenders were frequently organised by the colonial government in the region. This pattern underscores the inconsistency and arguably the lack of genuine commitment of the colonial administration in enforcing forestry regulations oriented toward environmental sustainability.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTION

INU. Methodology, conceptualisation, literature search, data curation, formal analysis, visualisation, writing-original draft, and editing. **AA.** Conceptualisation and supervision. **ES.** Conceptualisation and supervision. **FN.** Screening, writing-review, and editing. **IRS.** Screening and editing. All authors have read and agreed to the published version of the manuscript.

CONCLUSION

The coastal region of the Pekalongan Residency was not only geographically strategic but also had significant natural resource advantages. These advantages were further supported by a multiethnic labour force. Together, these factors attracted investors to establish capitalist-oriented industries in the region, including manufacturing, agriculture, plantation enterprises, and forestry. However, the high intensity of industrial activity did not merely generate economic benefits; it also produced substantial environmental consequences. Excessive exploitation degraded the coastal areas of the Pekalongan Residency. Green spaces gave way to plantations and industrial infrastructure, contributing to ecological imbalance. This transformation became a key factor behind recurrent flooding, which damaged transportation

infrastructure, destroyed residential areas, and disrupted local communities' daily activities. Accordingly, capitalism and environmental exploitation in the Pekalongan Residency were inextricably linked to Dutch colonial intervention through the implementation of the *Agrarische Wet* (Agrarian Law) of 1870 and the Ethical Policy. Consequently, political dimensions played a pivotal role in driving ecological degradation in the region.

The environmental policies the colonial government implemented to address these problems yielded few significant positive outcomes. Flooding and environmental degradation persisted throughout the 20th century. In essence, the Dutch colonial administration's environmental improvement policies were largely superficial, constrained by underlying capitalist economic interests. While such policies were formally enacted, exploitation not only continued but, in many cases, intensified with the establishment of new large-scale industrial enterprises. This condition shows that colonial environmental policies reached an impasse and functioned primarily as normative instruments that legitimised and sustained colonial practices in the Pekalongan Residency rather than achieving genuine environmental protection. Although industrialisation contributed to environmental degradation, it was not the sole cause of flooding in the Pekalongan Residency, as flood events were driven by a complex interplay of factors, including weather conditions, precipitation levels, and local topography.

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