Colonialism and Climate Crisis: The Root of Environmental Changes and the Rise of Environmental Awareness in Indonesia

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Abstract

This article explores the roots of environmental changes in the history of the Dutch colonization of Indonesia. It analyzed how the Dutch colonial exploitation, which was based on trade capitalism and later industrial capitalism, drove the re-organization of nature and integrated it into the world market system. As a result, it brought about systematic and structural deforestation, transforming the landscape of many parts of Indonesia. However, the state of deforestation raised concerns about environmental degradation as it is entangled with the importance of sustainability in extracting natural resources. From that point, the colonial environmental awareness paradigm was embarking. This article shows how the Dutch colonization and exploitation system directly led to significant environmental changes accumulated in the current climate crisis. Nevertheless, on the other hand, it also drove environmental awareness.

Keywords: Climate Crisis; Colonialism; Dutch Colonization; Environmental Changes; Deforestation; Environmental Awareness.

Introduction

The climate crisis is one of the most significant challenges to humanity today. Moreover, it is expected to become even more intense in the future. In 2020, more than 11,000 scientists from 153 countries signed an article warning that the earth was in a climate emergency phase and that more disasters would occur related to rising global temperatures (Ripple, 2020). Today, many natural disasters associated with climate change occur in Asia, Europe, and other parts of the world. Therefore, it is increasingly important to know the roots and origins of global environmental changes in history. Aside from raising awareness, it is also to understand better how humans can change nature – or in some cases, the damage it causes – and the consequences.

Environmental changes, likewise climate crisis, is a disputable term. There are many debates among historians and social scientists about whether only modern civilization -specifically Western civilization - is negatively interpreted as destroying nature. In this debate, Jared Diamond argues that from the beginning, Homo sapiens tended to change nature and encourage the extinction of many species. This occasion continues until the birth of the world's ancient civilizations. It does not matter whether

civilization is Western or Eastern; all tend to change, destroy nature, and cause the extinction of civilization and certain species (Diamond, 2017).

Although humans tend to change the environment from the beginning, only recently have humans been able to systematically and structurally change nature on a massive and global scale. Marx, Woster (1993) to Moore (2015) have drawn a line between the rise of capitalism and the global environmental changes that followed. Magdoff and Foster emphasized that modern civilization is capable of causing increasingly destructive environmental changes due to the increasing human population, increasingly efficient technological developments that create damage, and an economic system that knows no boundaries (Magdoff & Foster, 2018, p. 2).

How did capitalism and environmental changes closely relate in the beginning? How do humans create an economic system that has no limits that subsequently significantly impacts the global environment? Many Marxist scholars argued that the rise of capitalism was rooted in a crisis of feudalism in 14th-century Europe. It sprung debate about why and how capitalism developed in Europe. Anderson (2013), Gottlieb (1984), and Amin (1985) argued that the rise of capitalism in Europe was because of the unique and superior characteristics of Europe society. This thesis was resisted by Blaut (1989), who emphasized that the transition of capitalism was laid in the Europe conquest and colonization since the 15th century.

Wallerstein (1980) to Bernstein (2020) also argue that colonialism has paved the way for the birth of capitalism by encouraging the integration of European colonies into the modern world system, or more specifically, into the market system. Structurally and systematically, natural resources were extracted from the colonies to meet market needs and revive the manufacturing industry in Europe. In other words, the mechanism of natural resources exploitation under the colonial regime directly stimulated environmental changes on a global scale, especially in European colonies in Asia, America, and then Africa (Grove, 1997).

According to Grove, it was in the colony where scientists realized for the first time how humans could change the environment rapidly. Hence, understanding the changing environment in the colony is vital to unfold the roots of the current climate crisis (Grove, 1997, p. 1-2). However, while Grove has described how the French and British colonization became a genealogy of change and global environmental awareness in general, it has yet to be explored how the impact of the dutch colonization on the environment in Indonesia. To what extent was the environmental impact caused by trade and industrial capitalism by the Dutch colonial regime? And how has it shaped the current environmental state?

By applying the historical research method based on literature studies, this study analyzed the environmental impact of the Dutch Colonization and how it precisely led to the birth of environmental awareness in Indonesia. The problem was approached with the perspective of environmental changes, emphasizing land-minded tradition. Accordingly, the discussion will focus on the most important manifestation of the exploitation of the colonial regime, specifically the commodification of land (Woster, 1993, p. 58). Firstly, the discussion will set to the running of Dutch trade capitalism in

the 16th century until the end of the 18th century and then continue on the industrial capitalist economic system, which was born at the same time as the second industrial revolution in the 1870s until the end of the Dutch colonial regime (Bernstein, 2020, p. 56). Secondly, the discussion identified the most apparent environmental changes, namely deforestation and landscape transformation, and how these environmental problems have become a genealogy of environmental awareness in Indonesia.

This study indicated that aside from the political, economic, and cultural issues, Dutch colonization in Indonesia also inherited the ecological problem. Of this matter, this article is expected to provide an alternative perspective in the form of an environmental paradigm in understanding the history of Dutch colonization in Indonesia, as well as considering environmental aspects as the subject of historical analysis, not merely as a complementary element in Indonesian history studies.

Colonial Exploitation and Ecological Transformation

Colonialism is a complex terminology that shaped human civilization from the 15th century to the end of the early 20th century. This terminology bears the significance of colonization, subjugation, cultural encounter, to modernization. Regardless of its complexity, the mechanism of colonial power is always carried out through a process of conquest and domination. Therefore, it is typical for the history of colonialism to leave traumatic wounds for the colonized people (Loomba, 2016, p. 2).

In the political economy context, colonialism was closely related to the commodification of nature, land dispossession, and the proletarianization of the people in the colonies. Thus, when discussed colonialism, it cannot be separated from the context of oppression rooted in the colonial exploitation system in the interest of extracting natural resources in the colonized country. Of this matter, how did the Dutch establish the reign for the sake of natural resource exploitation and extraction?

The Dutch colonization of Indonesia was initiated by a trading company called Vereenigde Oost Indie Compagnie (VOC). This trading company was born from the mercantilist economic system developed in Europe from 1600-1780. The strengthening of awareness of the state in Europe also contributed to the direction of the development of mercantilism which was competitive among European countries. In the mercantilism system, the state encouraged merchant groups to organize themselves into coherent and efficient institutions, resulting in the birth of trading companies such as the VOC and the EIC (Wallerstein, 1980).

The VOC became one of the capitalist trading companies that efficiently separated capital ownership and management. The VOC was equipped with political and military power in operating its trading system overseas. Its main objective was to win the wars and competition with other European countries across the seas for in seizing the tropical commodities at the lowest possible prices and sell them at high prices in the Asian and European markets (Gelderblom, et al., 2013).

The VOC practised a trade monopoly and later operated territorial power. By maintaining the system of territorial power, the VOC was transforming into a feudal lord by claiming land under its territory and excluding the inhabitants from access to

land. At the same time, the VOC also implemented a tribute tax system and forced the peasants to adopt settled agriculture in producing certain commodities to meet market needs (Breman, 2015). The operation of the VOC's territorial power was fundamental for the Dutch colonial reign in Indonesia.

The shift of the primary VOC market from Asia to Europe prompted various structural changes to the colonial mechanism in Indonesia. First, the increasing demand for tropical commodities on the European market, especially coffee, prompted the VOC to increase the production of export commodities from the colonies. In order to operate an efficient and cheap labour system, the VOC intervened in the local political structure by implementing an indirect system of government, specifically strengthening the position of local aristocrats to serve the export needs of the VOC (Breman, 2015, p. 11).

After the VOC's collapse, the colonial administration and exploitation system were maintained as it was during the VOC. Daendles, who arrived in a spirit of reform, also did little to restructure the colonial economy in Java (Van Niel, 2003, p. 158). Raffles' revolutionary spirit in economic liberalization through the land lease system could not have worked better in Java. After Java was returned to the Dutch, the colonial economic system in Java still needed to find an explicit form. As a result, the Dutch financial difficulties worsened, and the need to increase exports became urgent. Until then, Van Den Bosch offered a revolutionary but not new idea, namely the forced cultivation system *(kultuurstelsel).* This system was similar to the VOC tribute tax system.

The aim of the forced cultivation system was how, in the shortest possible time, Java could produce tropical commodities – especially coffee, sugar, and indigo – at low prices so that they could compete with similar products produced in the West Indies (Van Niel, 2003, p. 6). To achieve this goal, Van Den Bosch proposed replacing the tax system with the delivery of commodity harvests determined by the colonial government. Peasants were asked to set aside one-fifth of the village land and one-fifth of their working time -calculated 66 days per year to grow export commodities (Van Niel, 2003, p. 175). The forced cultivation system further affirmed that the colonial government was the landlord, and the peasants were the cultivators obliged to submit taxes to the colonial government (Van Niel, 2003, p. 78).

Decades later, the monopoly of exploitation by the colonial state was challenged by liberal groups who wanted the private sector to invest and exploit natural resources in the colonies. The liberal group finally won the contestation over the exploitation of the colonial regime with the issuance of Agrarisch Wet 1870, a law that encouraged the capitalization of land by foreign private companies throughout Indonesia. Through Agrisch Wet 1870, the colonial state formalized the VOC of the *verklaring domain*, where the government claimed "waste land" or unused land that could not be proven to belong to the property of the colonial state. This legal scheme also regulates various forms of land tenure and management rights by foreign entrepreneurs and companies, such as *eigendom* rights, *erfacht*, and concessions (Ikhsan, 2015, p. 75-76).

The shift from a monopolistic economic system to a liberal economic system cannot be separated from the context of changes in the global economy at that time. The market orientation has changed from the export of spices, confectionery, and stimulants to the export of raw materials (Wertheim, 1956, p. 67). The 1870s became the point of the rise of the European manufacturing industry, also known as the "Second Industrial Revolution" (Bernstein, 2020, p. 56).

The growth of the manufacturing industry directly prompted massive foreign investment in the colonial extractive sector (plantation, agriculture, mining) and upgraded transportation routes connecting to the world market. In other words, foreign capital stimulated the colonies to produce extensive raw materials for industrial purposes in Europe. As a result, in the 1870s, there was a second wave of colonial expansion in various parts of the world (Bernstein, 2020, p. 56). It reinforces a dependency mechanism of an imbalanced form of transfer of surplus resources which Wallerstein refers to as World System Theory (1974) and by Gunder Frank as Dependency Theory (1966), where raw materials flow from the territory of the "periphery" of the colonized country to the territory of the colony. The "center" of the fatherland for the benefit of the mother country's economic growth (V. Das, 2015).

In Indonesian history, the expansion of foreign private capital was accompanied by the birth of modern imperialism in the Dutch colonial state. The colonial state's aggression to fix its territory through *pax nederlica* was driven by the interests of foreign capital, which required a new frontier area to develop colonial extractive industries. In this case, the pacification carried out by the colonial state became a guarantor for the security of the extraction process in various frontier areas. Furthermore, the presence of the colonial state served as a guarantor for resource extraction by foreign private entrepreneurs through the 1870 *Agrarisch Wet* legislation scheme (Lindblad, 1989).

Agrarisch Wet 1870 significantly encouraged the expansion of plantations in Java and the Outer Islands. According to *Regeeringsalmanac 1901*, the area of private plantations in Indonesia in 1900 reached 1,548,595 hectares. In detail, about 502,602 hectares of private plantations are located on the island of Java, while on other islands such as Sumatra, Sulawesi, Kalimantan, Ambon, and Ternate, the area of private plantations reaches 1,045,993 hectares (*Regeeringsalmanac, 1901*). In the following years, the plantation area continued to expand. Statistics in 1938 show that the plantation area in all Dutch colonies in Indonesia reached 2,869,726 hectares, of which 1,250,706 hectares were in Java, while 1,619,020 hectares were on other islands (Tauhid, 2009, p. 235). Of course, the growth of the colonial extractive sector was also accompanied by the construction of infrastructure networks such as ports, railroads, and roads for export to the world market.

This aggressive expansion has indeed succeeded in increasing the value of exports. The total export value of the East Sumatra region was f. 600,000,000 in 1930 (Geertz, 1976). An outstanding achievement for the economic growth of the colonial state. However, there were various economic, social, political, and environmental problems behind the colonial state's successful integration into the global economic

system. More specifically, plantation expansion initiated and accompanied by the expansion of colonial state power led to social agrarian conflicts, labor exploitation, and environmental changes.

What is the relationship between colonial extraction activities and ecological transformation in Indonesia? First, the colonial mode of production must be seen as an ecological phenomenon articulated in agricultural activities. In this case, agricultural activities are interpreted as a process of intervention in the ecosystem. Agricultural activities that began during the neolithic revolution were the initial process of humans being able to domesticate ecosystems by reorganizing flora and fauna to produce food. This process produces a new ecosystem unit full of human intervention called an agroecosystem (Woster, 1994, p. 50). Moore (2015) later formulated reorganizing the nature of capital accumulation as world ecology. From a world ecology perspective, capitalism was not merely regarded as an economic system but as an ecological system in which humans and nature were organized in the interest of capital accumulation.

The reorganization of local plants and animals into an agroecosystem has existed long before modern times. The process begins with a primitive form of agriculture, burning forest land to clear a patch of land. Then, the plot of land is planted with the desired plant species and taken care of from pests until the harvest. Agricultural activities are transferred to the following plot of land when soil fertility declines. This primitive farming method persisted until capitalism prompted the birth of new farming methods. Under the capitalistic economic system, the reorganization of nature becomes part of the creation of surplus for the sake of accumulation. As a result, the whole complex ecosystem is simplified through commodifying soil, which is then referred to as land as a factor of production. In other words, the land is becoming a specialized factor for producing commodities for world markets (Woster, 1994, p. 57-58).

Colonial expansion introduced an agricultural system based on a capitalistic economy called a plantation. This agricultural system requires the land to produce intensively one type of crop to meet market demand (Woster, 1994, p. 57-58). In the process, there are two reasons why plantation plays a significant role in shaping the ecology of the colony. First, the interest in producing export commodities encouraged the VOC and the colonial state to introduce new plant species and encourage agriculture in Indonesia (Van Niel, 2003). As a result, various plant species from outside Indonesia, such as coffee, sugar cane, rubber, sisal fibre, oil palm, tobacco, and others, were introduced as new agricultural commodities, especially after forced cultivation in 1830 and the liberal economy of 1870. Second, the need for the monocultural crop in large-scale agriculture drives deforestation and landscape transformation in colonized areas. In the end, deforestation is at the root of various environmental problems, such as land degradation and disruption of the hydrological cycle (Grove, 1997).

Deforestation and the environmental problems

Deforestation is increasingly becoming a critical issue related to the recent escalation of climate change. Referring to the Regulation of the Minister of Forestry of the Republic of Indonesia No.P.30/Menhut II/2009, deforestation is a permanent change from forest area to non-forest due to human activities (No. P. 30/(Menhut II/2009). Deforestation has developed into a critical issue in Indonesia since the 1990s. The FAO report in 1990 showed that Indonesia's forest cover had decreased from 74% to 56% in 30-40 years, with a tendency to increase, from 300,000 ha/year in 1970 to 600,000 ha/year in 1980 and reaching 1,000,000 hectares in 1990. Indonesia's steadily increasing deforestation rate is attributed to the rolling commercialization of forest products since the 1960s. In the 1990s, Indonesia became one of the world's largest exporters of tropical timber, with revenues of US$ 5.5 billion or 15% of total non-tax revenues (Sunderlin & Resosudarmo, 1997).

Although it developed into a critical issue during the New Order era, deforestation due to timber extraction and forest conversion activities can be traced back to its history from the early days of the VOC in Java. Deforestation was an integral part of the colonial regime's economic growth. The Dutch, who were initially interested in controlling the spice islands in Maluku, immediately turned their attention to Java because the primary consideration of their colonial economy was how to produce agricultural products from the colony. However, the island of Java was a strategic place for the VOC. Not only because of its location in the middle of the Asian trade route but also because of its fertility resulting in rice and abundant wood availability (Boomgaard, 1992).

During the VOC period, deforestation in Java Island was caused by the extraction of teak wood for shipbuilding needs. The quality of Javanese teak has been known as one of the best materials to build ships with firmer support than European wood. Since the 17th century, teak wood has become an essential commodity for various purposes, such as building ships, houses, offices, furniture, and fuel. When the VOC set foot in Java, the availability of teak forests was still abundant. To gain access to teak forests, especially on the northern coast of Java which includes Rembang, Jepara, and Pekalongan, the VOC set into a cooperation agreement with the Mataram authorities. In addition to the North Coast of Java, the VOC extraction of teak also covered the Cirebon area. By working with these local authorities, the VOC gain access to forests and loggers in the depths of Java's forests (Peluso, 2003, p. 53-57).

In the middle of the 18th century, teak logging by the VOC was carried out through a selective logging system, which only cut down teak trees of a certain quality and size. This system has caused significant damage to teak forests in Java because, in the process of logging, the fall of teak can damage other trees. In addition, uneven forest clearing makes it difficult for teak seeds to grow because more giant trees block them. According to Boomgaard, teak forests on the island of Java produced up to 22,800 stems per year in the second half of the 18th century. It was estimated that this amount was far exceeded since Chinese private entrepreneurs were also a big player in the teak extraction process in Java's forests (Schaik, 1994). When Raffles arrived in

Java, he said that most of the forest on the North Coast of Java had disappeared (Schaik, 1994).

Not only extracting teak in the forests of the North Coast of Java, but the VOC built the foundation of the colonial state's exploitation system through sugar and coffee plantations. The VOC around the Batavia area has carried out experiments on sugar plants since the early 19th century. Similarly, tobacco in the highlands of Kedu, Central Java. Meanwhile, the trial of coffee plantations was carried out in Priangan, the highlands of West Java. As a result, coffee became the VOC's leading tropical commodity, with 50% of the world's coffee trade supplied by the VOC (Muhzin Z, 2017). In the next period, the forced cultivation policy implemented by the colonial government succeeded in encouraging the production of tropical commodities through the expansion of sugar, coffee, tobacco, and indigo plantations on the island of Java. However, this success has come at a significant ecological cost (Boomgaard, 1992).

The economic growth of the colonial state in the period 1826-1865 prompted an ecological transformation called the era of destruction by Boomgaard, which was marked by massive deforestation and land degradation. In addition to the interest in clearing land for plantations, forests were also intended to support the growth of the colonial extractive industry during forced cultivation. In 1832, the forest came under the jurisdiction of the agricultural service. Thus, forests can be freely cut down to build sugar factories, coffee warehouses, dry tobacco warehouses, fuel, railroads, and official houses (Peluso, 2003, p. 72-73).

Boomgaard estimated that in 1843 up to 100,000 logs were cut down teak, and 175,000 logs in the next twenty years (Boomgaard, 1992). Since the VOC founded Batavia in 1619, the deforestation rate on Java island has sharply increased. Until the end of the colonial state's rule, of the Java Island area of around 132,000 km2, only about 24% was still covered with forest. Apart from teak extraction, most of the forest land on Java Island has been converted into plantation, agricultural, and residential areas, especially after the forced cultivation period (Boomgard, 1992).

Schaik noted that perennial plantations such as coffee plants grown in the highlands encourage deforestation and contribute to erosion and land degradation. Along with economic growth during forced cultivation, the island of Java also experienced a population explosion which made the conversion of land functions even more massive for rice fields, gardens, and settlements. As a result, in the second half of the 19th century, erosion and land degradation became common phenomena found on the island of Java. This phenomenon was directly related to deforestation in the highlands, expansion of tropical plantations, and population growth. Schaik argues that from 1830-1930 more than half of Java Island was converted from forest to cultivated land (Schaik, 1994, p. 74).

Erosion, a big problem for the development of the plantation industry in Java, was driven by natural factors and human intervention factors. Naturally, the climate and topography of Java Island make the land prone to erosion. However, Van Schaik argues that deforestation for the sake of expansion of coffee plantations in the

highlands and poor land use by the colonial government were the causes of the erosion phenomenon that was common in Java in the 19th century. This phenomenon was caused by decreased soil organic matter content, which maintains soil structure and absorbs water content. The decline in soil binding capacity also triggers drought in the dry season due to the evaporation of soil water content and flooding in the rainy season due to sediment accumulation along river flows (Schaik, 1994, p. 74-75). Therefore, in the early 20th century, the colonial government began to pay more attention to deforestation activities and the threat of disruption of the hydrological cycle and water availability in lowland areas (Nibbering, 1997, p. 155).

Similar to what happened in Java in the first half of the 19th century, the Outer Islands, especially Sumatra, also experienced colossal deforestation for expanded plantations and mining. In particular, attention will be paid to the East Coast of North Sumatra because this area is a perfect example of how significant ecological transformation is due to the colonial liberal economic scheme. Since the colonial government passed the 1870 Agrarian Law, this area has been flooded with foreign private capital. Before Jacobus Nienhuys arrived in 1863, the East Coast of North Sumatra was overlooked by the colonial government because most of the area was swampy and covered by primaeval forests. In just 25 years since the arrival of the Nienhuys, some 250,000 hectares of forest have been transformed into plantations (Van de Wall, 1959). At the beginning of the 20th century, in the central area of plantations, *cultuurgebied* area, forests only remained about 18% of the area. Most of the forest land in the area became Deli tobacco plantations to meet export needs to the European market. At the beginning of the 20th century, more than 1 million hectares of land on the East Coast of North Sumatra had become plantations of tobacco, rubber, fibre, tea, oil palm, and other raw material commodities (*Encyclopedisch Bureau*, 1919).

Environmental degradation, such as land degradation, erosion, and sedimentation that causes river flow narrowing, also occurs in East Sumatra. Tobacco plantations, which are the backbone of East Sumatra's economy, were a crop that could quickly absorb soil fertility. The large-scale adoption of shifting cultivation for tobacco plantations upscaling land degradation that was more significant than that of coffee plantations in Java. The expansion of tobacco plantations into the highlands was also one of the reasons for the loss of most forests. As a result, this area was experiencing land degradation and weather anomalies that caused rainfall to fall unfavourably, both for plantations and the population in general. In addition, significant floods often occur in this area and even encourage the appearance of coastal swamps due to river sedimentation exacerbated by soil erosion (Itawan, 2020).

Since the second half of the 19th century, a major ecological transformation has occurred in colonial Indonesia. The growth of the colonial extractive sector led to the loss of large parts of the forest and population declines or even the extinction of certain species. For example, animal beasts, such as tiger and crocodiles, was hunted due to the involved conflict with humans (Boomgaard, 1997). In addition, other less harmless animals were getting rid of their habitat due to plantation expansion (Itawan, 2020). However, the ecological transformation signified by the shrinking of forests and the

threat of declining export volume, both in Java and outside Java, prompted the colonial government to rethink the future of their agricultural economy in the colony, which led to managing the environment.

The rise of environmental awareness

The ideology of modern environmentalism emerged in the 1960s-1970s, along with the increasing intensity of environmental changes on a global scale. The widespread discourse on tropical forest destruction, the threat of species extinction, global climate change, and industrial disasters after World War II raises anxiety about the earth's future and humanity as a whole. From there, environmental destruction was propagated until it finally occupied many aspects of humankind's modern world (Woster, 1977). Although it developed as a global ideology after the 1960s and 1970s, the discourse of environmentalism is not something that has just emerged. Grove stated that the roots of the ideology of global environmentalism could be traced back to the 16th and 17th centuries. In this regard, Grove emphasizes a clear relationship between European expansion, the penetration of capitalism, environmental change, and the rise of environmentalism (Grove, 1997, p. 37).

According to Grove, environmental degradation was formulated from observing the relationship between deforestation and decreased rainfall. The concept of this relationship comes from the Greek naturalist Theophrastus, whose work was published in conjunction with the European Renaissance movement. In 1571, this concept became widely known as Fernandez Oviedo, Francis Bacon, and Edmund Halley co-theorized it. Environmental awareness about the effects of colonial extraction activities has grown in the Portuguese and Spanish colonies of the Canary Islands and Meidera. It is on the island that understanding of the relationship between deforestation and climate change is growing. However, this was the first time conservation practices were carried out in St. Helena, a British colony in the southern Atlantic Ocean, in 1750. On this island, the first efforts to prevent deforestation and soil erosion were carried out (Grove, 1997, p. 6). The idea of environmental degradation continues to be produced and propagated worldwide through organizations such as The Royal Society, the Royal Society of Arts, the Academie des Sciences, and The Royal Geographical Society. The idea continued to evolve, and in the 1860s, the concept of environmental degradation was incorporated into forestry policy and land management (Grove, 1997, p. 26).

When it started to clear the teak forests on the north coast of Java, the VOC also realized the severe damage caused by over-exploitation. Massive logging activities have damaged teak forests and caused a decline in timber production. To overcome this problem, in 1777, the VOC implemented a selective logging system for teak, which was considered to meet the standard of wood thickness. The VOC also formed a commission in 1796 to investigate the state of the forest. As a result, it was found that there was severe forest destruction and the commission recommended the cessation of all logging activities in Java. However, the great benefits of timber extraction activities make these recommendations only last on paper (Peluso, 2003, p. 62).

Since the collapse of the VOC, the forest management plans were conducted by Daendels, who later founded the forestry service in 1803 and generalized the *blandong* system. In general, Daendels prohibits the overexploitation of teak wood by imposing restrictions such as prohibiting the system of renting forest land by private entrepreneurs and prohibiting the transportation and purchase of wood outside the government forestry service (Boomgaard, 1992, p. 10). However, when Raffles came to power, Daendels' forest management policies were repealed and replaced with a system that prioritized the interests of timber exports. As a result, the forestry service was disbanded, and private entrepreneurs were once more given a license for exploitation. Boomgaard, in particular, underscores Raffles' policy of severely damaging the forests of Java (Boomgaard, 1992, p. 10).

Furthermore, when Java was returned to the Dutch, forest management was again neglected because the colonial government focused on forced cultivation policies. In the policy of forced cultivation, forests were sacrificed in the interest of economic growth. In 1849, the colonial government began to pay attention to forest governance for sustainable exploitation by initiating scientific and organized forest management by involving forestry experts from Germany (Peluso, 2006). When forest destruction, especially in the highlands, had an impact and threatened the level of agricultural production, the colonial government issued a forestry law in 1884. In this law, the colonial government stipulates that forest areas above 4,000 feet are not allowed for logging and forest logging for other interests. This policy is based on reserving water catchment areas in the highlands (Nawiyanto, 2007, p. 225).

In general, environmental awareness originated from the anxiety over the sustainability of colonial exploitation in the Dutch colony in Indonesia. Later, the anxiety is manifested in policies to prevent environmental damage, which are integrated with policies on agricultural and forestry practices, as mentioned by Grove. For example, in the second half of the 19th century, soil fertility decreased, and erosion increased, especially in the highlands of Java. As a result, there is a decrease in coffee production and other tropical commodities. In addition, deforestation and land expansion -both for plantations and settlements and rice fields- in the highlands significantly impact soil conditions in the area. Therefore, to prevent further damage, the colonial government issued *Gouvernementsbesluit van 1873* and *Ontginningsordonnantie van 1874* (Nawiyanto, 2007, p. 224).

Through those laws, the colonial government required plantation entrepreneurs and residents to implement agriculture that could reduce soil erosion, especially in highland areas. The government encourages agricultural techniques by applying terraced land to prevent further erosion. It aims to maintain the soil structure from the possibility of erosion (Nawiyanto, 2007, p. 224). Meanwhile, residents also take steps to prevent erosion, such as sloping streams of water, making fences out of euphorias and building stone walls around the planted areas. Although the government has made regulations on erosion prevention since the second half of the 19th century, until the 1930s, little effort was made by the colonial government to increase land conservation efforts among residents (Nibbering, 1997, p. 156).

In contrast to Java, where efforts to conserve land and protect forests had begun in the second half of the 19th century, outside Java, forest and land exploitation activities had just begun. This occasion related to enacting the Agrarian Law of 1870, which allowed foreign private entrepreneurs to expand to areas outside Java. Massive plantation expansion, as happened in East Sumatra, was the leading cause of deforestation and environmental degradation. In this area, the forests were deforested massively due to the opening of tobacco plantations. At the beginning of the 20th century, forest loss in the highlands of East Sumatra also led to the phenomenon of weather anomalies and changes in rainfall, which threatened the sustainability of the tobacco plantation industry.

As in Java, planters also encouraged the government to intervene to overcome the problem of environmental degradation. In 1912, forestry experts were sent to East Sumatra for the first time since they were first exploited in 1863. Their main task was to ensure that upland forests were protected so that the climate and hydrological cycle remained favourable for tobacco plantations. In addition, the forestry service was also tasked with preparing for the exploitation of primary forests in areas that have not been exploited by plantations, considering the timber crisis has been a severe problem in this region since the late 19th century (*De Sumatra Post*, 1912).

At the beginning of the 20th century, the colonial government only began to pay attention to forestry conditions in areas outside Java. In East Sumatra, where the forest was damaged, and the timber crisis was severe. This state of deterioration also happened in other parts of Sumatra. At the beginning of the 19th century, Sumatra was an area covered with forests and timber reserves, but at the beginning of the 20th century, deforestation and timber crises occurred in various areas, such as Bengkulu, Palembang, and West Sumatra. Therefore, since the beginning of the 20th century, the government began to promote forest management in Sumatra by sending forestry experts from Java. The main reasons for forest management outside Java Island were the interest in sustainable exploitation and maintaining the balance of the climate and hydrological cycle. Thus, the position of forests in upland areas was critical. Therefore, the crucial task of the forestry service was to declare and protect reservation forests in the highlands (*De Sumatra Post*, 1912). The problem of forest conservation in Sumatra at the beginning of the 20th century confirmed that the basis of environmental awareness in the Dutch colony in Indonesia was rooted in economic interests.

Conclusion

The climate crisis faced by humankind today originated from a significant transformation of the modern civilization since the mid-19th century. Therefore, the roots of its birth cannot be separated from the history of European colonization worldwide. From the history of Dutch colonization in Indonesia, it can be seen that the climate crisis is an accumulative phenomenon of changing the colonial economic structure, which directly impacts the landscape due to deforestation. This process was driven by a market mechanism centred in Europe.

The impact of the Dutch colonization on Indonesia has long been the subject of historical studies, but ecological change is still a rarely discussed issue in Indonesian historiography. In the context of the Dutch colonization of Indonesia, environmental changes were an unavoidable consequence of colonial extractive economic activities, which began during the VOC period and reached their peak in 1870. Changes in the economic structure oriented to the market system became the root cause of Indonesia's shifting of human and natural relations. With its ecosystem's complexity, nature is fully interpreted as a commodity. As a result, the natural resource extraction process under the colonial regime was exploitative and destructive, whose impact we can still feel today.

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