

ACCESS TO DRINKING WATER SUPPLY SYSTEM IN COLONIAL CITIES OF JAVA, 1900 – 1930S

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Abstract. In the 1900s, river water pollution in several cities in colonial Java became a severe crisis due to domestic and industrial waste. River water that was not fit for consumption threatened public health with outbreaks of diseases. For this reason, a policy to provide drinking water through the construction of pipelines, utilizing natural sources such as springs, became necessary. However, this project prioritizes water distribution for the European community rather than the local population, which desperately needs clean water. This research examines how the drinking water systems that exploit springs are not only a solution but also leave long-term impacts on society and the environment in Java cities during the colonial period. This research uses a historical method with an environmental history approach. The results show that drinking water supply infrastructure improved the urban hygienic environment and emphasized social inequality in the community.

Keywords: Drinking Water, Environment, Inequality, Colonial cities, Java, Indonesia

INTRODUCTION

The era of colonialism is an era of domination in any context that causes inequality because one party always wants to control the other party (RM & Aflahah, 2019:12). This happens because the rights, powers, and obligations are fully regulated by the original country as the center of government so that administratively the new region becomes a subordinate state of the central state system (Miftakhuddin, 2019:59). The process of colonization not only changed the social and political order but also had an impact on the environment such as the massive exploitation of natural resources to meet the interests of the economic sector of the colonial state. Dutch colonialism is a significant episode in history that has changed the overall appearance of Indonesia, which has many negative impacts on aspects of the lives of residents (Wihardyanto & Ikaputra, 2019:147).

Water, a vital resource for human life, became a very strategic commodity in the context of colonialism. Java Island was the government center during the Dutch colonial era (Wihardyanto & Ikaputra, 2019:147). In colonial cities such as Batavia, Surabaya, and Semarang, the demand for clean water increased along with population growth and dense economic activity. Even in the smaller colonial cities in Java, the demand for irrigation water and clean water, such as water for consumption, is increasing and is needed. Therefore, building a drinking water supply infrastructure solves the problems faced in several colonial cities that experienced an emergency need for water consumption.

However, the increase in population due to immigrants and the dense economic activities of the Dutch East Indies period were not the only reasons for planning a water supply system. The pollution of water sources was the reason for the water supply project to be accelerated by constructing a pipeline network. Water pollution has a significant impact on public health, especially in local communities with poor conditions, causing outbreaks of diseases that can be transmitted due to consuming polluted water, such as cholera and endless diarrhea.

In general, the Bumiputera population is at a low socio-economic level, which is further exacerbated by the lack of education and sanitation awareness. So, their natural environment tends to be of poor quality. Economic inequality and the clean water crisis are caused by people experiencing poverty and having difficulty accessing this water. In some colonial cities, you must pay for it to access it.

This access gap exacerbates existing social inequalities, as it limits the ability of marginalized communities to improve their health and living conditions. Furthermore, water was one of the most complex issues in Dutch East Indies colonial cities. The problem was limited to water for household needs, bathing or washing, and bodily consumption. Therefore, a drinking water supply system must be built immediately.

Studies related to drinking water in the context of historiography still need to be written because drinking water is often seen as a secondary topic. Still, a book from the Ministry of Public Works and Public Housing (2015) clearly shows the development of drinking water over time in all parts of Indonesia. Specific studies on drinking water in colonial cities, especially in Java during the Dutch colonial period, have yet to be written. However, explanations of drinking water can be found in research on clean water in the Dutch colonial period. Meanwhile, studies on local political dynamics related to river water pollution issues were produced by Anton Lucas and Arief W. Djati (2000), which focus on the issue of pollution and the political dynamics of Surabaya city because long before the provision of clean water pipelines, residents utilized river water as drinking water.

Previous research that intersects with this theme tends to highlight the aspect of clean water because clean water is a vital need for aspects of life, ranging from preventing various diseases to maintaining aquatic ecosystems, food consumption, and water consumption. Some research on clean water in colonial cities, such as that conducted by Primaditya (2022), focuses on clean water pipelines in colonial towns in Java, and Amini (2024) focuses on the efforts to establish a water governance system to overcome the clean water crisis in Semarang in the early 20th century. The research examines clean water management in Bandung from the late 19th century to the early 20th century (Budiman et al., 2023) and the development of clean water supply in colonial Cirebon (Mutawally et al., 2024). In addition, water management is not only a basic need but can be a tool of power, a symbol of modernity, and social control that increasingly exposes social and ecological inequalities (Achdian et al., 2020)

Research focusing on colonial urban environmental issues, such as the colonial government's efforts to fix problematic canals and flooding in the Oud Batavia era, focuses on the root causes of urban problems in Jakarta (Mulyanto, 2022). Meanwhile, access to clean water for both household needs and consumption is closely related to the environment because the quality of the environment depends on the availability of clean water, which will affect health, social life, and the sustainability of natural resources. For example, the habit of people in the city of Surabaya who like to dispose of feces in the river causes the condition of the urban environment to be dirty, causing river water pollution to have an impact on public health, which then becomes part of the problematic in Surabaya so that the implementation of health is needed (Aditya Indrawan, 2021). While colonialism and social hierarchy are some of the impacts of inequality in access to clean water, which prioritizes the needs of colonial society, for example, the politics of water supply can form inequality of access for the urban poor, which makes their quality of life even lower and vulnerable to ecological changes in the city of Semarang (Sutrisno, 2023).

This research discusses access to drinking water supply in colonial cities in Java. More specifically, the problem is elaborated into several problem formulations: (1) How was the drinking water supply system in Javanese colonial towns? (2) Who benefited from drinking water supply projects, especially in water access? (3) How did drinking water supply projects impact the environment? Furthermore, this research aims to explain the access to drinking water supply systems in colonial cities in Java to create environmental quality by exploiting water from springs, which has a long-term impact on the community and the environment. On the other hand, this solution emphasizes social inequality and unequal access to water in the community.

The theme was chosen based on interest in the environment. The focus on colonial cities with *gemeente* status, such as Batavia, Semarang, and Surabaya, was selected because these three cities had serious microbial pollution problems, and the same pollution also occurred in several other *gemeente* in Java. This article focuses on the Dutch colonial period. It started in 1900 as the starting point because planning and awareness of the need for clean water pipelines began this year due to

the emergence of plague one by one enveloping colonial cities in Java. The increasing number of European residents who came and settled in colonial Javanese towns showed that hygienic environmental quality was needed. Furthermore, the limit of the research period is in the 1930s because many Javanese colonial cities already had their drinking water supply systems by exploiting springs suitable for consumption, and there was no bacterial pollution from domestic waste or other pollution. This research only considers the possibility of discussing a little outside of the specified periodization to provide more insight and still have a related discussion.

RESEARCH METHOD

Mastery of methods and methodologies is the main foundation in understanding and analyzing historical events by thinking analytically and logically to understand the causes and effects of these events. This research uses historical research methods, from selecting topics to the source collection stage (heuristics), verification, interpretation, and historical writing (historiography). Then, this research takes a different perspective by focusing on environmental history. Environmental history aims to understand the past relationship between humans and the environment through various perspectives covering human contact with their habitat. Of the four categories in the study of environmental history, this research is included in the category of environmental problems with the concept of pollution and the environment.

Primary and secondary sources in this research were obtained from the National Archives of the Republic of Indonesia (ANRI) in Jakarta, printed media such as contemporaneous newspapers and reports related to drinking water obtained from Delpher.nl, and photographs obtained through the official website of the KITLV library collection which was very helpful in writing. Secondary sources were obtained from the national library in Jakarta and regional libraries. The sources obtained, especially primary sources, are then analyzed in depth by linking other sources to provide an overview of the provision of drinking water in the colonial city of Java with a chronological sequence limited to the scope of the specified analytical framework, namely colonialism and environmental quality.

RESULT AND ANALYSIS

Modernizing colonial cities in Java brought major changes in water resource management and presented serious problems in the lives of residents and the environment. The river, the main source of clean water, is polluted by household waste and industrialization in the city. Of course, the polluted river is not suitable for consumption by the population. On the other hand, population growth in colonial cities in Java has increased dramatically, for example, in Batavia, Cirebon, Surabaya, Surakarta, and Semarang. This also happened in colonial cities with *afdeeling* status. Then, things got worse when health problems due to pollution and low quality of life occurred among the population. The cause of this condition is the crisis of drinking water suitable for consumption and the inequality of access to this water. Meanwhile, the hygienic environment for Europeans further reinforced the social gap between the native and more privileged colonial populations.

3.1. The Development of Colonial Cities in Java

As mentioned by Nas (1989:5), based on the historical journey related to the development of cities in Indonesia, are divided into traditional, indistinct, colonial, and modern cities. The distinctive feature of colonial cities is the concentration of social, economic and political power in the hands of the colonial government. According to Kuntowijoyo (2003:64), The characteristics of colonial cities are characterized by the presence of residential areas close to the center of government, the presence of the Chinese population, the presence of the colonial service sector, the presence of immigrants from nearby areas and residents with middle to lower social status. Therefore, the colonial city is not only characterized by an organized spatial layout with the availability of modern infrastructure

such as waterways, roads, transportation, and ports, but the social segregation between colonial and native residents reflects the characteristics of the colonial city.

The first colonial city built by the Dutch in 1619 was on Java Island, Batavia, and that year was considered a new phase in the development of other cities in Indonesia (Nas,2007:304). Before the Dutch colonials built the city of Batavia, there was a very good plan for the development of the city of Batavia. The design was named *plan de Batavia* (Ratih,2021:51). Thus, planning in the development of a colonial city is very important in addition to the city looking neatly organized but also emphasizes colonial power in controlling space, increasing economic efficiency, and creating a hygienic environment for the European community which in turn is apparent social inequality and neglect of the needs of the native population. From the perspective of environmental historiography, the planning of colonial cities in Java often utilized surrounding natural resources such as exploitation of timber, water, land, and agricultural land, whereas every form of exploitation not only damaged the surrounding ecosystem but, from a social context, showed existing social inequality, for example in accessing clean water.

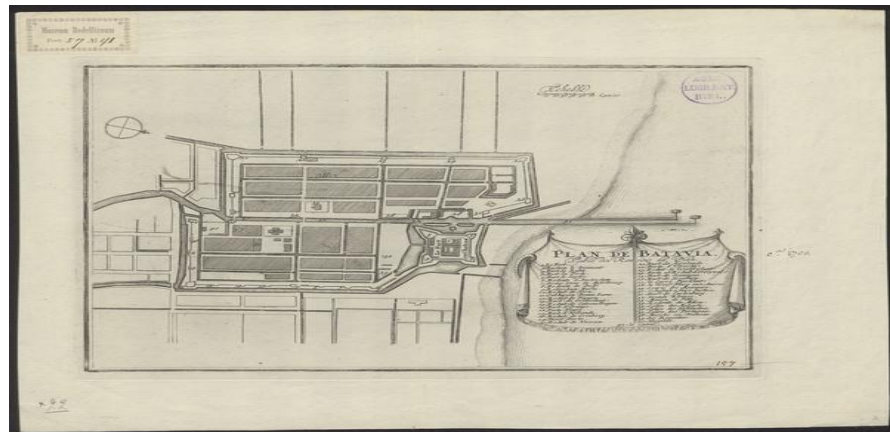


Fig. 1. A Development Plan of Batavia

Source: KITLV No Item 2013505 – Plan de Batavia COLLBN Port 57 N 41.

The establishment of the B.O.W (Burgelijke Openbare Werken) made the development of colonial cities in Java progressively better in the early 19th century (Ratih,2021:52). The B.O.W. was the Civil Public Works Department during the Dutch colonial era one of four public affairs departments established by Koninklijk Besluit on September 21, 1866 through the gazette of the Dutch East Indies (Staatsblad No.127.). Under the Governor-General's direct supervision, the B.O.W was responsible for supervision and maintenance, including bridges, canals, harbor works, and large buildings whose management was also delegated to the various regions (Jong & Wim Ravesteijn,2009:52).

Most colonial cities in Java adopted the Dutch style, such as the city fort in the city center, such as Batavia and Semarang, which had the status of *gemeente* (municipality). The forts that surrounded the two cities were built as protection in case the native population attacked the Dutch population and served as canals like those in the Netherlands (Prasojo,2015:27). On the other hand, Bandung during the colonial era has colonial building relics that are lined up and neatly arranged in several city centers in Bandung (Wardani,2016:29). The development of colonial cities in the coastal area was found in the cities of Surabaya and Semarang with ports that were useful for colonial interests as centers of trade activities. In the early 20th century, Semarang was one of the fastest-growing cities after the colonial government made it a *gemeente* (Amini,2024:38).

In 1906, the enactment of a legal basis passed by the Dutch led to the city of Surabaya becoming a city with rapid progress based on administrative divisions or authorized to regulate its territory so that from an ordinary colonial town to a *gemeente* (Sudarmawan & Basundoro,2013:1-5). Therefore,

Surabaya has great potential as a center for managing the industrial, development, and trade sectors, along with rail transportation support and being a major port, making the city even more complete. Surabaya is one of the largest sugar commodity exporting cities in Java, strengthening the city's position as a strategic city for the center of economic activity in East Java by controlling rice, human power, and trade rights, especially in sugar commodity transactions (Aradian,2018). According to Howard Dick, the city of Surabaya will be unmatched by any other port city, such as Bangkok, Shanghai, Hong Kong, Singapore, Rangoon, and Calcutta (Howard W,2002:17). On the other hand, Surakarta as a Vorstenlanden region began to see the process of modernization in the late 19th and early 20th centuries with the development of urban infrastructure, facilities, public facilities and infrastructure and even a more modern clean water piping network and a clean water company that manages it (Primaditya,2022:44).

Dutch colonial cities in Indonesia have been affected by modernization, especially on the island of Java. Establishing several sugar-producing factories was the beginning of modernization in the Dutch East Indies in the second half of the 19th century (Primaditya,2022:177). The development of modern infrastructure, such as waterways and roads, and the availability of sanitation systems created an environment that met European standards. As a result of this modernization, colonial cities in Java experienced developments in the transportation sector, such as the opening of roads and rail transportation as a practical and timely means of distributing products. The arrival of Europeans during the Dutch East Indies was the reason that triggered the emergence of urban modernization, so there was not only a lot of migration of rural people to the city, for example, the city of Surabaya as the capital of East Java became one of the cities that attracted Europeans to come by establishing government and utilizing Surabaya as a traditional city to modernize by showing the potential for progress in social, political and economic aspects. Thus, Modernization has significant environmental impacts such as urbanization, which causes massive land conversion with dense population so that the need for water is increasing, and industrialization, which can trigger pollution of natural resources such as water as well as environmental degradation as a result of lack of waste management, air pollution and can even cause soil damage.

3.2.Utilization of River Water Sources for Needs

Since the days of the Dutch colonial government, many residents have relied heavily on the flow of river water around their neighborhoods. The river water is a vital source for them, especially in agricultural irrigation needs that support food production because most earn a living as farmers. For the Javanese, water has a profane nature and is sacred to fulfill daily needs such as water for drinking, bathing, washing, and other household needs (Kartoatmodjo,1983:1-6). This is reinforced by the construction of Bumiputera villages around the river, such as rural areas (Adi,2019:2). Meanwhile, rivers were also used as transportation routes to support trade activities and transport commodity products. However, this method was not practical, so the Dutch colonial government began planning the construction of railways to provide more effective and efficient rail transportation.



Fig. 2. Situation in Kalimas Riverbank, Surabaya.

Source: KITLV No. Item 855899 - Soerabaia, Bandaran, Kalimas te Soerabaia.

The kalimas river is one example of the use of the river as water transportation with sampans and small boats transporting commodities such as spices and fish caught by fishermen by bringing these

commodities into the area in the city of Surabaya to an area called Kayoon (Nanang,2011:87). From the picture above; it can be seen that the Bumiputera population is on the banks of the kalimas river transporting crops on the island of Java, of course, prepared for export needs, especially to the European continent. The picture explains if the kalimas river is the main route connecting the open waters with the interior of the island (Mutfianti & Soemardiono,2012:48). In addition, we can see that there are boats and small sailing ships that are anchored, indicating that there are many boat and sailing ship visits from various regions or islands. In addition, this river has a parent river called the Brantas River, which stretches from the Mojokerto area to the Madura Strait (Adi,2019:3).

River water flow can be a consumption need for residents because of clean water all activities will run and daily needs can be met. The Brantas River is used to fulfill the daily needs of residents, such as drinking water, washing, cooking, and bathing, and it is not uncommon for the river to be used as a place to bathe livestock such as cows and buffaloes. However, this river has a problem of bacterial pollution; even after the Dutch colonial government ended, 1985 an environmental audit revealed the fact that industry was responsible for 80 percent of polluting the Brantas River water from Mojokerto to Surabaya (Howard W,2002:235). The pollution of the Brantas River is a sign that the environmental impact of industrial development and population behavior can pollute rivers that are a source of life and reduce the quality of the environment of the native population. The river water is not suitable for consumption, so the dependence of the population's clean water supply on this river must be stopped; if it continues to be consumed, it will impact health with the emergence of endless epidemics and a higher mortality rate. The problem of pollution in the Surabaya River was reported during the dry season in 1982 with the news that “*Drinking Water Turns Cloudy and Smells Bad*” (Surabaya Post, 19 Maret 1989).

Meanwhile, the Bandung *gemeente* is flanked by two pairs of major rivers, the Cikapung River and the Cibadak River, although many other rivers pass through the *gemeente* (Budiman,2022:267). The river is a vital source of water for the people of Bandung, such as residents who are in the highlands utilizing a large river, namely the Cikapundung River as a supply of drinking water needs before the availability of drinking water installations (waterleiding) in 1911 (Kunto, 1986; Yusandi, 2022). The river water is very clear, allowing the people of Bnadung to use it for washing, bathing, cooking, and drinking. If the population does not behave badly, such as throwing feces in the river, the river will be protected from pollution and bacteria. On the other hand, Magelang has a natural river that becomes a vital source in fulfilling the needs of the population, namely the Progo River, located in the west, and the Elo River, located in the east of Magelang City, which divides the Magelang city area but is located lower than Magelang area. However, the increasing population threatens the quality of these two rivers. Eventually, the Progo and Elo Rivers are polluted by household waste discharged into the flow of these two rivers, so the water is no longer clear (Wibowo,2017:167).

3.3.Drinking Water Supply Systems in Colonial Cities of Java

As with other infrastructure facilities, planning for drinking water must be done carefully and with strong fundamentals and techniques. The provision of piped drinking water in colonial Javanese cities was not just a basic need but also an effort to maintain a hygienic environment, especially for European communities. This supply system was usually introduced with a modern water distribution system with tools or technology that supported water distribution to houses or settlements. In addition, the provision of access to drinking water became one of the solutions to improve sanitation in the city environment and overcome infectious outbreaks such as cholera, even though access to water reflected social inequality between the native population and the European population.

At the end of the 19th century, Surabaya became a city that was desperate for clean water. Surabaya residents were waiting for a solution from the government to provide clean water services, and a cholera outbreak immediately exacerbated the situation. After waiting for a long response, the government only provided support but did not want to invest. The longer it is left unchecked, it will threaten the safety of the population and raise the death toll even higher. After conducting health propaganda, in 1903, the project to build a clean water channel in Surabaya was finally completed. Both European and local residents could access the water that had been long awaited (Algemeen Handelsblad, 4 November 1903) by taking clean water from the well of the private company

Mijnwezen (Von Faber,1931). The water is used for cooking, consumption, and other needs. According to newspaper reports, water distribution inequality occurs between the European population's access and the Bumiputera population. It turned out that the water supply project had an imbalance, with the European population being able to access up to 150 liters per day while the Bumiputera population who lived far from said elite settlements only got 5 liters per day (Soerabaiasch Handelsblad,18 Mei 1900) even though the Bumiputera population in Surabaya is the majority.

While Batavia was originally planned for 900,000 people in the early 20th century, the rapid urbanization of rural communities into Batavia resulted in the city experiencing the greatest population pressure (Basundoro. P,2013:11). This increase in population made Batavia a *gemeente* inhabited by various ethnicities, of course, the condition of the city really needed a clean water supply. In addition, the number of deaths due to epidemics in Batavia reached 64.3% from 1903 to 1911 (Tillema,1919:8-9). Then, in 1938, the average number of deaths amounted to 14,400 deaths/year, with 30.7% deaths of the Bumiputera population (Deli Courant, 1938). This situation has existed since 1863 in the *Bataviasch Handelsblad* newspaper (1863) reported as follows:

“Men heeft vroeger Batavia het graf van den Europeaan genoemd en beden nog schint de statistiek te bewijzen, dat Batavia minder gezond is dan andere plaatsen: moet dat niet grootelijks geweten aan worden het ellendige drinkwater?”

Because of the increasing death rate in Batavia, the direct quote information creates the image of Batavia as the tomb of Europeans. It mentions that Batavia is a city that is less healthy than other places because the water quality for drinking is very poor. Therefore, handling and prevention efforts are needed to reduce the increasingly high mortality rate, one of which is by providing clean water that has been laboratory tested and is free from contaminating bacteria. Before extracting the water supply from the spring, the government planned to provide drinking water by drilling an Artesian well in the southeast corner of Koningsplein. This project existed based on pressure from the residents of Batavia to provide drinking water immediately. Still, the project stalled in the middle of the road until the residents of Batavia never again heard the news of the continuation of the artesian well drilling (Bataviasch Handelsblad,1863).

The drinking water supply is obtained from a natural spring located at the Tjiomas spring site south of Buitenzorg with a maximum service pipe rental of 10 m. The applicant must pay for the pipe extension if more pipe is required. Water collection is set at 5 M³ per month at a cost of f.125; if accessing more water than specified, a f 0.30 per M³ will be imposed. Initially, access to water was free, but since the supply of water to villages using water dispenser technology, water is no longer free (Decentralisatie verslag,1929:96). However, in 1931, the results of bacteriological analysis of drinking water showed that drinking water was unreliable, so minimum water should still be boiled. This was because several European families in Batavia were found to have typhoid fever. The illness was linked to drinking water contamination, although the health department informed us that it was just a normal typhoid, so there was no need to worry about a typhoid outbreak (Het Nieuws Van Den Dag, 1931).

In the same case, drinking water supply was urgently needed in Semarang due to the increasing population and the high mortality rate in Semarang in 1901 due to cholera, which killed 1,480 people and reached 3,163 people in 1910 due to poor environmental quality, sewage discharged into the river, bathing in dirty water and consumption of water with a lot of contaminating bacteria (Tillema,1919:10). Additional reports from Semarang to Java-Bode that 23 people had contracted cholera with 19 deaths and 4 survivors even though the water supply project was still underway that year (De Telegraf,10 Mei 1910). Not only Surabaya, Semarang residents also sent a petition to Governor General Idenburg with the following report:

“Dat sedert de besmetverklaring op 22 Februari te Semarang 1800 choleragevallen voorkwamen. Voorts zijn typhus en dysenterie er sedert vele jaren epidemisch heuschende; dat alles is een gevolg van de slechte watervoorziening.” (De Avondpost,15 Juni 1910)

1800 cases of cholera, typhoid, and dysentery are epidemics that have plagued Semarang for years due to the lack of sanitation facilities and unavailability of drinking water supplies. Residents are hopeful that the construction of the Oengaran pipeline will begin soon and are concerned that the project will be delayed for up to a year. On the other hand, the city's lack of facilities, especially health infrastructure, has further degraded the quality of the living environment. European residents have also been worried about the situation, fearing death from the plague. With these plague cases and the statistics of deaths and population infected with the plague, Semarang is one of the colonial cities in dire need of potable water. *Gemeente* Semarang has an artesian pipeline network as well. Still, the lack of maintenance has caused the quality of this well to deteriorate, so the problem of drinking water needs for the urban poor has not been resolved (Amini, 2024:846). Moreover, Amini (2024:847) explains that the government's solution to overcoming the difficulties of the poor was to install public hydrants to obtain water for drinking and cooking as well as public washing around the city of Semarang in 1930.

In the Surakarta area, there has been a collaboration between three governments, namely the colonial government, the Sunanate government, and the Mangkunegaran government, to realize the construction of a clean water pipeline network, which ultimately resulted in a clean water management company incorporated as a legal entity (Soerabaijasch Handelsblad, 15 February 1930). The bubonic plague and influenza spread rapidly in Surakarta, making the government move to build a clean water system. This outbreak arose due to a bad environment. The formation of the *Vereeniging Solosche Drinkwaterleiding* association in 1924, apparently could not provide a solution to the implementation of the clean water development project in addition to the development funds that had a high nominal value (Primaditya, 2022:180). In 1925, an application was submitted by the chairman of the *Vereeniging voor de Drinkwatervoorziening van de hoofdplaats Soerakarta en omstreken* to build a pipeline of houses and buildings in the Pepe Waterschap area to provide drinking water in the capital city of Surakarta (De Locomotief, 23 Juli 1926). In the end, in 1930, Surakarta had its clean water supply that residents could use daily. A waterworks management company, *Hoogdrukwatervoorziening van de Hoofdplaats Soerakarta en Omstreken*, was established by agreement of the colonial government, Kasunan and Mangkunegaran (De Locomotief, 23 Maret 1929).

Bandung 1912 used artesian wells to provide clean water for 350 houses, which increased to 426 houses in 1914. Still, the Bumiputera population in Bandung could not afford to pay for access to this water, so those who could access the pipeline were mostly European residents and a small elite Chinese and Bumiputera paying 10 guilders. To overcome this inability to access water, the Bumiputera population utilized some open piping from artesian wells to sustain their daily lives (De Indische Courant, 15 Juni 1954). TN. Bertus Coop, as Mayor of Bandung at that time, received many complaints about the difficulty of the availability of clean water, so the solution to overcome these complaints was to exploit higher springs. Finally the discovery was fruitful with the Tjibadak water source at the foot of Mount Tangkuban Perahu. The Tjibadak spring was inaugurated and started operating in 1921; with this water source, Bandung has a water surplus of 80% which uses large pipe material, making Bandung a gemeente that no longer has a clean water crisis; even the Tjibadak flow water can also help irrigate the fields and gardens of the Bumiputera population (Het Nieuws van Den Dag Voor Nederlandsch-Indië, 31 Desember 1921). The installation of large pipelines requires careful planning, including choosing a pipeline route that is minimally disturbed because the installation of water pipes will involve excavation of soil at certain points, which can change the natural topography, thereby increasing the risk of soil erosion, especially areas with steep slopes such as at the foot of a mountain.



Fig. 3. Situation of Tjibadak Spring Opening Bandung

Source: KITLV No. Item 909368 – Opening van de Tjibadak-bron in de buurt van Bandoeng

Another situation occurred in the Magelang gemeente; the plague was rampant and contagious in e Bumiputera villages originating from polluted river water consumed and originating from the Military Tangsi, which caused the city government to plan the construction of clean water facilities with drinking water towers (*Watertoren*) (Wibowo.2017:168). Disease outbreaks in Magelang City in 1908-1922 in the slums, such as dysentery, cholera, diarrhea, and typhus (De Indische Courant,1922). Until the 1950s, there was no new plan to rebuild the watertoren to increase the city's water supply, so the watertoren pictured below is still relied upon for clean water supply in Magelang, where more than 5,000 consumers can access this water (De Locomotief, 6 February 1954). Still, it was not found when the construction of water pipelines to distribute water to residents' homes began.

In line with this, in 1916, a health mission by Hedrik Frek Tilema and Ir. Herman Thomas Karsten requested the Magelang gemeente government to build a drinking water channel for the entire bumiputera population (H.J Sjouke,1935). The social impact of the unequal access to water of the Bumiputera population is seen due to the actions of the Magelang *gemeente* government, which provides infrastructure for the needs of the European population. Tilema's solution with health propaganda, hygienic education, the availability of feasible drinking water sources, and good sanitation is a consideration for the Magelang *gemeente* government to provide a drinking water system. However, the final decision of the *gemeente* government was to build drainage and sanitation to reduce the disease outbreak so that it would not spread to European settlements. After all, the European population, the plague in the neighborhood of the European population is a threat. After such a complicated situation, Drinking water was provided through public hydrants that were not directly piped to people's homes so that their water needs for drinking and cooking could be accessed at public hydrants near the road. However, one village had a limit of 40 m³ per day (Verslag).



Fig. 4. Watertoren building in Gemeente Magelang

Source: KITLV No. Item 911271 – Watertoren te Magelang.

Water crises occur due to the increasing demand for water resources, threatening the well-being and sustainability of the environment, especially in urban areas. The epidemics that plague the native population as a result of water pollution are frightening to Europeans because they threaten health and reduce the quality of the environment, often leading to high mortality rates. As is well known, the entire Dutch East Indies region is included in the Tropical zone (Stroomberg, J,2018:17). Indonesia's tropical environment and the poor environmental quality of the neighborhoods where Indigenous people live are considered high risk for survival.

3.4.Environmental Quality of European and Bumiputera Residents

Differences in environmental quality between the European and Bumiputera populations began during the Dutch colonial period. Suffering in the 19th century was felt by both the European population and the native population because of an unhygienic environment; even very few residents of the Dutch East Indies were categorized in healthy living conditions (Wertheim,1999:146). The European population's perspective on environmental standards is a clean and hygienic environment. To realize this environment requires support for infrastructure development such as clean water systems, modern sanitation, and adequate urban infrastructure. Most of these facilities are built to meet the needs of the European population rather than the Bumiputera population, which lives far from their standards.

Basically, the Bumiputera population lives in villages or slums, so the quality of the living environment of the Bumiputera population is often poor, characterized by inadequate sanitation needs and minimal access to clean water. The social segregation carried out by the Dutch colonial government is very clear; for example, Kampung Ketabang Surabaya, which is an elite area for European residents, has complete facilities such as good drainage systems so that this area is not flooded even though the population is small (Hakim,2020:6). In Weltevreden there is segregation of the population division in Batavia, namely the first group of European residents, the second group of foreign Eastern residents and the third group of native residents (Castles,1966). Not only that, the residential division of the three groups led to the mapping of common residential enclaves in colonial areas, one of which was Batavia (Kartodirdjo,2020:83).

This situation and condition show how the *gemeente* government pays special attention to the feasibility of European settlements. Suppose there is an improvement in the living environment of the Bumiputera population. In that case, there is certainly pressure or propaganda by the population to express that their lives are very bad plus the difficulty of access to facilities and clean water. This situation has occurred to improve Bumiputera slums in Batavia, and health propaganda has been used to provide clean water in Semarang and Surabaya immediately. On the other hand, the bad behavior of the population has led to a decline in the quality of the environment. This was not the case for the Bumiputera elite, who had a better life even though they remained under the control of the Dutch colonial government.

The behavior of people who like to throw garbage into the river and bathe in the river causes the water to be polluted, and residents contract cholera, typhoid, and dysentery (Nawiyanto et al.,2018:226). Batavia, Semarang, and Surabaya are the cities with the highest cases of microbial contamination due to environmental pollution. The high expansion of the industrial sector makes pollution not just ordinary microbes but began to be faced with artisanal pollution originating from industrial activities (Von Faber,1931:12). So, the pollution is not only due to the growing industrialization but also due to the bad habits of the bumiputera population. The lack of access and inadequate sanitation facilities are why these bad habits exist. Both require careful and planned solutions so that this pollution does not persist; for example, solutions in the form of improving sanitation infrastructure, providing drinking water pipelines, and better waste management to create awareness of the importance of maintaining water quality for health and the environment. On the other hand, it is natural that many rivers are polluted, especially the large and small rivers in Batavia, Semarang, and Surabaya. River water quality will decline due to this pollution, making access to potable water increasingly difficult. The impact of pollution also threatens the environment with damaged river ecosystems, so serious policies are needed to improve the sustainability of water resources to maintain ecological balance and meet the needs in the following years.

CONCLUSION

The provision of drinking water in colonial Javanese cities was a strategic response to environmental and health concerns caused by urban growth and inadequate water infrastructure. Building modern water distribution facilities such as piped networks signaled an effort to create a hygienic urban environment. However, at the time, the interests of these developments seemed to favor one community over another. Existing policies show how unequal water distribution and access control made it difficult for the Bumiputera population so that marginalized groups often accessed water from open channels. At the same time, the more the springs were exploited without planning for the return of water from other sources, the more degradation occurred, and the less water was available. Given that from 1900 to the 1930s, there was a growing population in the colonial city of Java and colonial settlements, water distribution to consumers would have increased, and the discharge was not small.

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