

Geological Science and the Making of Colonial Oil Frontiers on the East Coast of Sumatra, 1890–1930

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Abstract

In the early 20th century, the Dutch Empire emerged as a prominent oil producer internationally, with the Netherlands East Indies leading the way in petroleum production. The colonial petroleum industry's success was bolstered by scientific and technological advancements that streamlined the oil exploitation process. Geology played a critical role as a scientific tool that facilitated the conquest of landscapes and crude oil control along Sumatra's east coast. The study of geology supported the colonial oil politics, leading to a new era of oil mining exploitation through robust economic partnerships between the Dutch colonial government and private oil companies. This paper aims to explore the link between Dutch colonial scientific agency and the establishment of an oil extraction territory that transformed the natural environment and social conditions on the east coast of Sumatra, from Aceh to Palembang.

Keywords:

Geological science; colonial oil frontier; east coast of Sumatra

Abstrak

Pada awal abad ke-20, produksi minyak bumi di Hindia Belanda telah mendukung kebangkitan kerajaan minyak Belanda sebagai salah satu produsen minyak utama dari wilayah jajahan hingga seluruh dunia. Kejayaan industri minyak kolonial bertumpu pada perkembangan ilmu pengetahuan dan teknologi yang menyukseskan proses eksploitasi minyak. Geologi muncul sebagai alat ilmiah kolonial sebagai ilmu pertambangan baru untuk menaklukkan bentang alam dan mengendalikan minyak mentah di pantai timur Sumatera. Kajian geologi telah mendukung politik perminyakan kolonial untuk menciptakan medan baru eksploitasi pertambangan minyak di bawah kerjasama ekonomi yang kuat antara pemerintah kolonial Belanda dan perusahaan minyak swasta. Tulisan ini bertujuan untuk menyelidiki hubungan antara agensi ilmiah kolonial Belanda dan berdirinya teritori ekstraksi minyak yang mengubah kondisi sosial dan alam di pantai timur Sumatera dari Aceh sampai Sumatra Selatan.

Kata kunci:

Ilmu geologi; kawasan minyak kolonial; pantai timur Sumatra

Introduction

Sumatera rises to global significance by the end of the 19th century, thanks to the establishment of the plantation money of *Deli Maatschappij* in 1869 and the subsequent discovery of oil on the east coast. It quickly became known as the “America of the Indies” and played a central role in the world’s export commodity trade with foreign companies (*De Buitenbezittingen 1904-1914*, 1919: 127; The Kian Wie, 1989: 137). Oil production drastically changed the colonial economy throughout the Netherlands East Indies in the late 19th century, replacing sugar, coffee and tobacco. From 1905 to 1930, oil revenues greatly contributed to colonial coffers, further entrenching Dutch imperialism in Asia. The oil industry also spurred local economic development, such as the hiring of imported labour, which reached a peak of 57,000 men. In 1907, the Dutch oil company merged with a British company to form Shell, which would go on to dominate the oil industry (Lindblad, 1989: 53-77).

The oil fields in Sumatra are mainly located in the east coast, stretching from Aceh to Palembang in the north-south direction. To exploit the mineral potentials, the Dutch colonial government produced many comprehensive maps from the works done by the scientists to emphasis on “economic geology” as the keywords to understand the connection between the two; economy and geology. Oil was considered the top of profitable mining commodities which boosted the development of colonial economic industry and it was first mentioned separately under the heading of colonial mining in the colonial reports in 1890 (Rutten, 1932: 199-120; Scholten, 2003: 192). In order to establish an oil industry, the assistance of science is crucial. The colonial government had invited European scientists to explore the oil deposits using geological science. The development of geology had become an important tool in transforming the natural landscape into an area of oil capitalism. This exploration had led to the transformation of wilderness into industrial environments that triggered the establishment of oil drilling sites and the emergence of urban towns along the east coast of Sumatra. However, this process also involved confronting the wilderness to conquer the environment and the people living there. Building the rigs to extract oil from the ground required the use of advanced technology. After the first successful oil drilling in Langkat, East Sumatra, many geological surveys were conducted through the subjugation of natural landscape and local knowledge.

The Doctrine of Economic Geology

In 1949, Reinout Willem van Bemmelen, a leading Dutch geologist, published a volume of *The Geology of Indonesia, Vol. II: Economic Geology*, which contains a collection of geological surveys and observations. The emphasis on “economic geology” is the keyword to understand the connection between the two: economy and geology. Geology had evolved into a science to mark

the rise of the global petroleum industry. It is based on the doctrine of “economic geology”, which articulated the basis of the modern geological study of oil exploration. Economic geology became a powerful science after the discovery of oil fields in Titusville, Pennsylvania (United States), by Edwin Drake in 1859. He gained worldwide attention for his unconventional method of extracting oil from the surface. Since then, oil has become a lucrative commodity, with modern machinery and technology replacing traditional methods of extraction. The commodification of crude oil reveals the importance of technological developments and geological engineering in the era of global oil capitalism.

The development of geology as a science can be divided into two different fields; “pure geology” and “economic geology”. The ideological formation of “pure geology” highlights the function as an “exact science” without investing in any practical outcome. It is rooted in Ancient Greece and Rome in constructing a theoretical thinking or hypothesis that defines a geological formation in some parts of the world, such as Herodotus in 500 A.D., who mentioned the land formation in Egypt (Versluys, 1932: 11-12). Meanwhile, “economic geology” emerged in the 16th century to facilitate a practical use for mining underground minerals when a German physician, Calbus Fribergius, wrote a book “*Bergbüchlein*” to expose the theory of ore deposits and metallurgy as a study of mining extraction (Versluys, 1932: 13). It showed the earliest economic geological literature and pioneered the first foundation of “*Bergakademie*”, a mining engineering in Freiburg, Germany. It supported the professionalization of trained coal miners, which later inspired other schools of thought in Europe, including the Netherlands. The economic geology became the foundation of science for the mining industry to manifest geology as “applied science” that relied on mastery of theoretical knowledge and practical training. From the German mining science, the Dutch geological science began to develop in the mid-19th century. Since 1877, the basic of geological study was taught in the Netherlands by the German professors in Leiden, Utrecht and University of Groningen (*Geologie en Mijnbouw, 12-1940*: 285). Later on, the principles of “economic geology” had generated “petroleum geology”, which more specifically concentrates geological science on searching for oil sources. It has relied on the anticlinal theory that increases the possibility of oil discovery beneath the ground through geological observations above the ground. It highlighted the trapped-oil within three layers of the underground reservoir in different densities; gas on top, oil in the middle and water on the bottom (Fehner, 2011: 71-72). The anticlinal theory was studied and practised as a discipline of geological investigation among Dutch geologists to support the foundation of the colonial oil mining industry.

In the 19th century, stories and images of the success of the American

oil industry foreshadowed the Dutch control of oil production in the Netherlands East Indies. However, the development of geological science in the Netherlands had stagnated for several years. It began to revive right after oil was discovered in the Netherlands East Indies in the end of 19th century after Adriaan Stoop, a Dutch mining engineer, managed to find productive oil in East Java and founded the first private oil company, the *Dordtsche Petroleum Maatschappij* Company (DPM), in 1888. Stoop succeeded in controlling oil production in Java with promising profits and established himself as the most successful oilman. The colonial government had signalled some of mining engineers instead of geologists to look for oil locations but received frequent reports of failure. The search for oil wells became a business opportunity until the discovery of the Langkat oil in East Sumatra with the establishment of *Koninklijke Maatschappij tot Ontginning van Petroleum Terreinen in Nederandsch Indie* or Royal Dutch in 1890. King William III of the Netherlands himself injected funds and issued permission to propose the company name “*Koninklijke*” or “*Royal*” (Van Lier, 1918: 13). In 1907, a subsidiary of Royal Dutch-Shell, *Bataafsche Petroleum Maatschappij* (BPM), was founded by a merger with the British Shell company to control oil production in the Netherlands East Indies. Afterwards, the colonial government cemented the strength of the colonial oil industry by collaborating with BPM and state engineers to exploit oils in Sumatra.

From the success of geological findings, the Dutch State started to institutionalize geological science in the Netherlands as the knowledge production center of geological study. The project started with the plan to build geological education in Delft University by the Dutch government and Association of Delft Mining Engineers. Since 1905, Delft became the center production of colonial geologists and promoter of sending their alumnus to lead geological investigation and providing professional practitioners for private oil companies. Delft housed geological education within the Mining Department (*Dienst van Mijnbouw*) with modern curriculum that was formulated by leading geology professors, such as Molengraaff, J. Grutterink and J. van Bemmelen. The profession of trained geologists had attracted to the employment on consultant of geological research and development for oil companies. From the first establishment until 1930, more than 5.000 engineers were graduated from Delft University (Waltman, 1930: 18).

Dutch Geologists, Native Personnel and Geological Bureau in the Indies

In May 1920, a group of high-rank Dutch engineers held the first Asian Congress of Engineers in Batavia, which invited international experts from The United States and the Philippines. They were supported by the Royal Engineers Association Group in the Netherlands to reunite and discuss the

role of colonial engineers in the future exploitation of minerals for the Dutch economic development within the colony. In the section of Geology and Mines (*Mijnbouw en Geologie*), a BPM geologist, mentioned that geologists gained their scientific expertise from the development of global oil industry as pre-advisers to guide exploration teams and find locations of oil deposition by studying stratigraphy and plate tectonics (Escher, 1920: 4). They had to take initiative on practical implementation in order to extract the natural and human resources under Western technological advances.

Investments in trained geologists created a new power of geology as a scientific discipline to increase the accuracy of mineral discoveries for the colonial government. The urge for geological research began with the obligation to establish an independent geological institution for colonial mining, which had been controlled by mining engineers without geological expertise for so long. An association of geologists and mining engineers was established through the formation of the Geological Mining Society for the Netherlands and the Colonies (*Geologisch-Mijnbouwkundig Genootschap voor Nederland en Koloniën*) in 1912. Since then, the pursuit of geological research in the Netherlands East Indies has been controlled and produced by Dutch geologists within the higher institutions from the metropole. The geological study in the Netherlands was primarily taught at the Technical University of Delft (TU Delft) to produce Dutch geologists and compete with other non-Dutch professionals. In 1911, the nature of the mining and geological work in the Netherlands East Indies was discussed among engineers to meet the urgent need for geologists to train to explore the archipelago as *terra incognita*. Delft University became the first state university to offer a vocational school diploma program. The program aimed to train future geologists and was under the Bureau of Mines (*Mijnbouwkundige Afdeling*). It is not surprising that a mining engineer can also be trained as a geologist. However, the existence of the geological profession has shifted its absolute position due to the lack of capacity and capability in geological knowledge for mining.

In 1901, the Minister of Colonies J. Th. Cremer expressed the wish that mining and geological explorations in the Netherlands East Indies should prioritize the discovery of useful minerals and promote mining as a resource for the Colonial Government. This brought the importance of exploring minerals to public colonial interest. In 1913, a Dutch geologist, Waterschoot van der Gracht was commissioned to reorganize the Bureau of Mines to emphasize the importance of State control over the extraction of minerals (*opsporing van delfstoffen*) and negotiations with the private sector, including on the management of petroleum industry (Van der Gracht, 1915: 1). He arrived in Batavia to inspect and investigate at the Bureau of Mines and then travelled to an oil mining site in the Kerinci Mountains in Jambi, which made him an important figure on the colonial advisory board to initiate control of

oil exploration in Jambi. It had led to restrictions on wealth and liberalization of private oil businesses which dominated the oil business until the end of the early 20th century. The Jambi oils had reacted to protests from the Dutch Leftists in the Parliament to take over assets and exploration permits by the State or the so-called “*staatsexploitatie*”. Several anti-capitalist Dutch geologists emphasized that state control of mining operations was a form of control mechanism over private oil companies to create prosperity for colonial society. However, the “*staatsexploitatie*” plan failed with the establishment of a business partnership with private companies.

In 1905, the Dutch geologists had signalled to reorganize the institutional body of colonial mining department with the foundation of Bureau of Geology (*Geologische Dienst*) in Batavia which operated under the Bureau of Mines (*Dienst van Mijnwezen*). The foundation of geological survey became a political and economic agenda of colonial government to control mineral deposits through the visionaries of geologists. Based on the operational standard classification of the oil business, there are two types of geological and mining work; “exploration” and “exploitation”. “Extraction” was the process of taking resources from nature, while “exploitation” pursued the project of extraction and production into commercial products. In practice, both divisions of worker were held by Europeans and Natives. The geology service must be led by a Dutch geologist who has expertise in mining exploration fieldwork. The geologist could appoint personnel upon approval of the Delft Committee of Engineers. Recruitment of native personnel was facilitated due to consideration of field expertise. Most of them received vocational or technical training at *Wilhelminaschool* or Vocational School in Batavia. European personnel were selected for the character of independent work and assessment in the field, while native personnel conducted schematic work, such as topographic surveying, boundary line mapping and formation geology. The native candidates were trained for the first six months with a very low financial allowance. The salary increases for those who proved suitable for further training, while the unsuitable were sent home. The colonial government dealt with the work of European geologists and mining personnel who had difficulty living in the midst of isolation in the wilderness. Many of them often experience rapid employee turnover, which creates a shortage of skilled staff. Many of them did not return after their leave because they were placed in tropical forests far from the city centre. A Delft geology professor, Molengraaff, addressed this difficulty by recruiting fewer European field geology employees on a contract basis rather than hiring many permanent employees at once over a period of four to five years.

When private enterprise was introduced in the field of mining, the extraction of mineral rights should be regulated by law, particularly after oil was discovered in Java (Ter Braake, 1944: 21). The establishment of the



Figure 1. The main building for Delft Mining Engineering. **Source:** Waltman, *De Technische Hoogeschool te Delft, 1905-1930*, p. 115.

Geological Service within the colonial agency has demonstrated the authority of geologists which played a role in changing the Mining Laws. The Mining Act of 1899 was issued by the Governor General to control all private company operations and transfer legal powers of the oil mining business to the colonial government. In 1910, the Colonial Government amended the Act of 1899 Mining Law, which made oil a source of state economic commodities, to ratify *Petroleum Ordonnantie*. The amendment was issued to regulate the standard operating conditions of the oil business and gain profits from private individual businesses. The contents of the law aim to enforce the tax authority of oil production in the Netherlands Indies. "Petroleum" is any flammable liquid, which, if poured into water, will spread in a layer that floats on top, for example, naphtha and gasoline. In terms of controlling the land, the license of prospecting and concession can only be granted by the Governor General only if the territory of a region can be proven geologically and technically (Ter Braake, 1944: 22-23). The license is revoked if geological research is not carried out after one year with a maximum concession area of 1,000 hectares (about 4,000 acres). Concession registration is addressed to the Governor General by making a permit application letter to the Mining Service.

Vernacular Knowledge and Geological Investigation

The geologist's fieldwork involved creating a map of an anticline to locate specific oil deposits by conducting a geological survey. This survey required the use of equipment and technological advancements to produce topographical maps. The main objective of this survey was to locate a

suspected geological structure that would determine the successful outcome of drilling. However, the drilling also resides on luck and unpredictable result since many prospectors had discovered dry wells. Before the study of petroleum geology, the search for oil depended on nature and local knowledge where the prospectors and wildcatters had collected their prediction to find oils. The early suspicion of the oil deposits relied heavily on native knowledge of places in the forest that emitted natural gas and oil in the swamps. According to Fehner, twentieth-century petroleum geologists were “vernacular prospectors” who performed an application of geological study and mastery of local knowledge. (Fehner, 2011: 21-22).

The use of vernacular knowledge in petroleum geology has strengthened the scientific understanding of finding oil deposits, thereby increasing the accuracy of oil exploration. In his book “Researches on Ptolemy’s Geography in Eastern Asia,” Colonel Gerini recounts the story of explorer Jan Huygen van Linschoten, who discovered an oil well that produced “oil balm,” which local residents had been using since 945 A.D. Additionally, there was a source of burning oil in Deli (East Sumatra), which the Sultan of Aceh used to attack Portuguese ships. The Dutch later brought samples of this liquid and processed them into medicine for rheumatism and sciatica. (Ter Braake, 1944: 66-67). In several areas in East Java, local residents have long known “*lantoeng*” as crude oil used for medicine which is extracted manually (Witkamp, 1918: 83). Several places in Java and Sumatra also indicate the use of oils for lubrication such as “*Kampong Minjak*”, “*Sungei Minjak*”, and “*Pelantungan*” from “*lantung oil*” or kerosene (Poley, 2000: 5). In 1883, a Dutch planter named Aelko Zijlker made the first oil discovery for the Royal Dutch company in Langkat from an anonymous native worker. He suspected that the worker had lit a lubricated fire torch in the middle of the night, which led to the discovery. After smelling a fennel odour, Zijlker conducted a site investigation with the help of locals, and collected several oil samples. The samples were sent to a laboratory in Batavia for further scientific research. As a result of his discovery, Zijlker became a leading hero of Royal Dutch oil history who initiated other oil prospectors in the archipelago (Gerretson, 1932: 80).

The development of petroleum geology was collected from local sites where European geologists made use of local knowledge to gather information in the field. In the Netherlands East Indies, the role of local workers was involved since the beginning of the colonial oil industry (Fakih, 2021: 92). In the wilderness, the drilling works were operated between locally trained coolies and colonial prospectors. In some conditions, prospective hills or forests were explored with a reward for locals who signalled clues of oil deposits (Witkamp, 1918: 15-17). The exploring works between geologists and nature demonstrated the need for a local agency to control uninhabited land and unpredictable natural disasters. The Dutch geologists employed Chinese

and Javanese workers to do manual works in the field. The engagement of prospectors with locals became a rule of experts to conquer very large and uninhabited areas. Through a trained skill of locals, the practice of geological investigation was gained from mastering language to communicate with the local people and gaining vocabulary to produce vernacular glossaries for the Dutch geologists. The making of language translation became a manual guidebook to produce protocols for making an order and giving instructions to the workers. As written in “*Guidelines for Mapping Petroleum Sites*” to mapping oil, Douglas mentioned that local foremen had played a major role from the early pioneers of geological landscape mapping to drilling practices. In the making of topographical maps, they were employed for the opening of the “*rintis*” system, a Malay word for mentioning initial sensing of geological evidence in the densely vegetated landscape. The use of local language had facilitated a knowledge transfer as a manual book to give instructions to local workers (Douglas, 1915: 3-4). The local surveyor team consisted of 4 to 5 people: two men as assistants, one as a tripod porter and the other as a helper who cut bushes to expand the field of view. Soil contours were investigated with a compass or rattan belt for anticlinal recording with sketches before drilling.

The pursuit of geological investigation is directed to the final enterprise of drilling areas that require the use of technological advances and preliminary techniques. It demands manual work to transport hardware from distant areas to build oil rigs. Successful drilling was marked by the appearance of oil gushers, which allowed the release of fire gas into the air. The discovery of gushing oil indicates a sign of celebrating petroleum geology in controlling nature. The areas consist of several oil pits with numbers attached. The total drilling holes in Sumatra until 1942 had reached more than 4.000 pit holes (van Bemmelen, 1949). The drilling techniques used prototype applications of American drilling models, which often encountered failures and accidents. The colonial government and private oil companies adapted to natural conditions by creating a new drilling technique. Some of the earliest oil fields discovered in Aceh and East Sumatra failed because drilling machines were unable to penetrate the geological structure of the region. During the drilling at Perlak in 1912, the drilling also failed and required the assistance of an American drilling crew (Gerretson, 1932: 116). A Dutch driller who was in charge of the project, was unable to get his team to dig for oil. In 1923, a group of teams from California were summoned to drill oil wells in the Pangkalan Brandan. *Royal Dutch* developed a new drilling installation to adapt with local environment, namely the *KNPM system* or “*Tjotjok*” system which means “suitable” in Malay. This technique was combined with the local geological condition and it was finally successful and suitable for drilling in shorter times (Forbes & O’Beirne, 1957: 149-150). Since then, many technicians and oil



Figure 2. A geological investigation team in Sumatran jungle. **Source:** Gabriel, H. *De Koninklijke Olie: De Eerste Honderd Jaar 1890-1990*, p. 30.

Mineralen en gesteenten.		
	Javaansch.	Soendaneesch.
agaat.	watoe akik.	batoe akik.
aardolie.	lengo potro.	minjak taneuh.
aluin.	tawas.	tawas.
breccie.	wadas petjah lin- giran.	tjadas lingir.
bruin ijzersteen.	tai wesi.	tahi beusi.
conglomeraat.	wadas boender.	tjadas boeud.
diamant.	inten.	inten.
gasemanatie.	banjoe ngoedal.	tjai ngagolak.
gesteente (hard).	wadas atas.	tjadas teas.
„ (week).	„ empoe.	„ ipock.
„ (verweerd).	„ gempalan.	„ paeh.
glimmer.	emas wedi.	emas kesik.
goud.	mas, emas.	mas, emas.
kalksteen.	gamping.	tjadas apoe.
klei.	lempong.	lempong.
koraalgesteente.	karang.	karang.
koraalkalk.	gamping.	apoe.
kwarts.	watoe lintang.	batoe bodas.
kwartsgrind.	krikil watoe lin- tang.	krikil batoe bodas.

Figure 3. Glossaries of geological terms in Javanese and Sundanese. **Source:** Douglas E. A., *Leidraad voor het Kaarteeren van Petroleumterreinen*, 1926.

drilling experts from Royal Dutch were sent to America to study oil drilling techniques.

Controlling Oil Frontier

After extensive geological research, the landscapes of oil discoveries in Sumatra were meticulously mapped and it became a hub for oil prospectors, leading to the development of oil industrial capitalism. The growth of petroleum companies fuelled the oil frontier, which engineered modernization of oil industry in remote areas to build oil towns and establish the territoriality of private oil corporations among the local authorities. As a giant private oil corporation, Royal Dutch (BPM) showed its absolute economic power in controlling oil industry on the east coast of Sumatra through political lobby with colonial government and local rulers in the 20th century. Sumatra was divided into two main oil exploitation zones: North and South Block, based on the location of exploitation territory and refinery centres. Most of the oil production in North Sumatra came from East Sumatra and Aceh along the coast of Aru Bay. In Aceh, the colonial government started exploring oil in several regions, particularly in the area along the *Atjehtram* railway in the late 19th century. From 1915-1922, the anticlines were surveyed in 33 areas, including Tamiang and Perlak, the most productive oil reservoir owned by *Perlak Petroleum Maatschappij* and later by BPM (*Alg. Sec. Mgs. 1891-1942, No. 3641*). After the claimed victory in the Aceh War, the Dutch promoted Aceh as “het land van peper en olie,” or the land of pepper and oil (Broersma, 1925: 25).

Langkat in East Sumatra, had turned into massive exploration as the new petroleum belt with several major oil wells along the Lengan river, such as Telaga Tunggal, Telaga Said and Telaga Baru. It produces “Crown Oil” from refining crude oil into kerosene as a high-quality lubricating oil in Asia (De Goey, 2002: 58). The Dutch prospectors maintained a political negotiation with the Sultan of Langkat by paying royalties to maintain amicable relations with local rulers (Jonker, 2007: 101). Since 1883, Royal Dutch was granted a concession permit with a 75-year contract with a refining installation in Pangkalan Brandan through oil pipelines on the banks of the Babalan River in 1892. Dutch negotiations with the Sultan of Langkat led to the expansion of oil exploration areas, for example the Besitang, Teluk Aru and Bukit Mas concessions in 1894. A businessman, Jacques Deen, also succeeded in obtaining a “Petrolia” concession permit but not long afterward his permit was revoked (Schadee, 1919: 146).

In the South Sumatra Block, the geologists led the geological investigation and succeeded in researching and publishing geological maps. The earliest geological investigator, Tobler, divided the rock structures in this region into “Upper, Middle, and Lower Palembang” which contain oil

(van Bemmelen, 1949: 696-697). Since the end of the 19th century, productive oil wells have continued to be discovered and extracted in some of the main largest drilling locations by BPM, such as Suban Burung, Sumpal, and Suban Jerigi. Plaju was built as an oil refinery centre that supports all refined oil production in the South. Near Banyuasin, there were Bayung Lencir oil wells and the Sumpal refinery. The Petroleum Company Moesi Ilir discovered oil in Musi Ilir and built the Bagus Kuning refinery. The Dutch colonial government also collaborated with the American Standard Oil Company to build NKPM (*Nederlandsche Koloniale Petroleum Maatschappij*) in 1912 with main oil wells in Talang Akar and Pendopo, where all oil production was channelled to the Sungai Gerong oil refinery (Gould, 1961: 60). Meanwhile, Jambi became an oil reserve area of Central Sumatra in accordance with the Mining Law in 1921. This law revealed the closure of concessions for mining exploration by the *Nederlandsch Indische Aardolie Maatschappij* (NIAM) which was founded in 1922 as a merger company between the colonial government and BPM. The largest oil drilling was operated in Tempino, Bajubang and Kenali Asam.

Oil wells are key drilling areas that are integrated into the oil pipeline network with the refineries to the coastal regions. The construction of the first oil pipeline has connected East Sumatra and Aceh. The oil is pumped into a pipe to the refinery which is circulated in tin barrels and sent via tanker to the shipping facility at Pangkalan Susu in 1897. For manufacturing pipelines, the forests in Sumatra were penetrated by the mechanization and industrialization of private oil companies that occupied the territorial boundaries of colonial oil towns. The towns had developed from a network of oil pipelines that flow to central oil refineries which boosted oil production to distant regions. One of the largest oil pipeline installations was the construction of “Djambi Pipeline”, connecting Plaju to Tempino in Jambi. It was called “*A modern pipeline construction through the jungle of Sumatra*” that stretched for 270 kilometres long that was completed in 1935 (*De Ingenieur*, 29-11-1935: 35). The construction began with the division of deforestation and land reclamation. To plant oil pipes in the ground and rivers, BPM employed 300 Javanese and Chinese workers, including divers to transport iron pipes from large rivers. On land, forest logging had started since 1934 by using tractors and explosives to chop down giant trees and the workers had pursued land reclamation for a total of 60 hectares.

From Tempino, oil pipelines penetrated into remote areas along with the construction of roads that brought modernization, such as Prabumulih, which evolved into an emerging oil town. This area was designed by contractors from *Hollandsche Beton Maatschappij* (HBM) to build roads, power plants, warehouses, and water dams, which involved deploying a Javanese workforce (*Nieuwsblad van de Residentie Palembang, Djambi en Banka*, 3-4-1939). In Muara Tembesi, the Dutch officials had reported the region as *een*

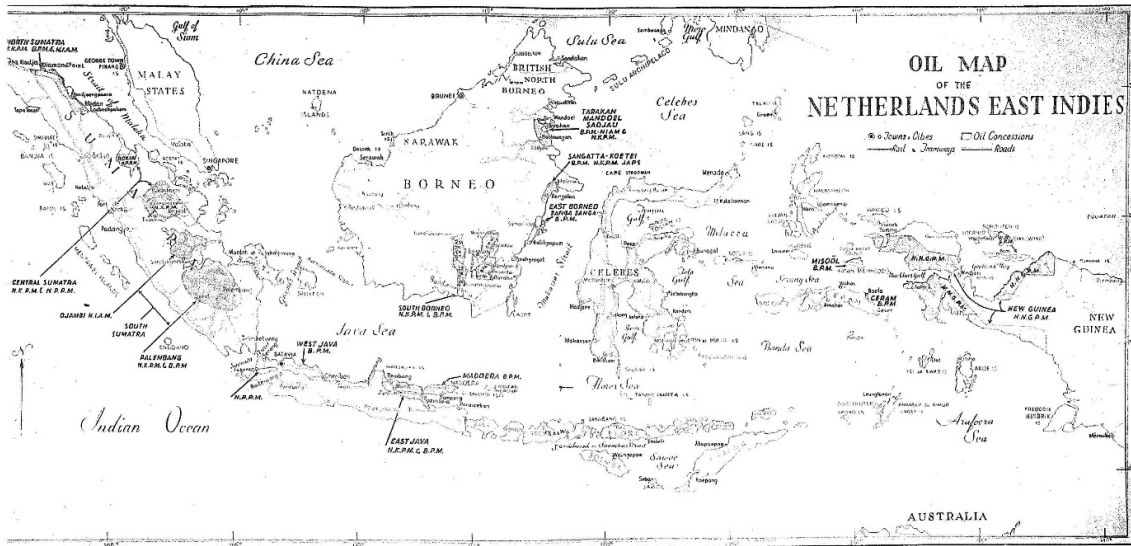


Figure 4. Map of oil fields in the Netherlands East Indies. (Source: Ter Braake, *Mining in the Netherlands East Indies*, 1944)



Figure 4. Construction of the Tempino oil pipeline with native workers, Jambi. Source: KITLV.

eenzaam land, waar we snel door heen rijden or “a remote area we had passed quickly”. In 1937, the construction of a concrete road penetrated along the Batanghari River into the rural areas that linked to the larger oil fields in Bajubang (*Nieuwsblad voor de Residentie Palembang, Djambi en Banka*, 27-7-1937). Tembesi, located 54 km from Tempino, gradually flourished with favourable housing, schools, military posts, and telephone lines.

Along the oil pipelines, the security emergency forces and surveillance were constantly monitored to prevent from oil leaks and anti-colonial movements. With the discovery of oil, the drilling area was secured by Dutch military penetration after Aceh was conquered. The Colonial Government brought major changes to the plantation economy and oil industry from being just a land of bloodshed and military-political agendas. In the early days of exploration, several areas were concentrations of local guerrilla resistance against the Dutch along the oil pipeline route. In 1893, Teuku Nyak Makam, an Acehnese commander who led attacks on Tamiang which expanded to the oil drilling sites in Pangkalan Brandan, was executed (*Minyak*, 1926: 554-557). Meanwhile, in Jambi, the praised king of Sultan Taha and his loyal followers who resisted to colonial oil prospectors were shot by colonial troops in 1904 (Scholten, 2003: 232-234).

The oil economic progress in Sumatra depends on the availability of skilled labors. The mobilization of indigenous oil workers became a key force for the expansion of the colonial oil industry in isolated areas. The needs of local workers have shaped the oil landscape, which requires conquest of local culture and nature. The colonial government and private companies took control of the entire recruitment process for local workers. They consist of contract workers and free workers, recruited from the communities or imported from outside regions. Most of the oil workers employed in North Block were brought from Java. In 1914, the refinery at Pangkalan Brandan was employed 3.000 workers from Java and 125 European supervisors (Lindblad, 1989: 58). Meanwhile, in South Sumatra, most of the oil workers were recruited from local communities. Between 1924 and 1926, 80% of workers in the oil industry in South Sumatra came from South Sumatra, and 20% from outside, mainly from Java (Tanjung, 2014: 304).

The oil mining industry was maintained with social order and stability through existing *coolie ordinance* law in the Deli plantation workers. Being an oil company worker meant working under the rules and mechanisms of the colonial social class division. The oil company created racial boundaries between oil workers within the industrial culture and residential landscape. The colonial oil industry was tied to the work ethics and corporate system of transnational management. "The Corporation", a leading European Union oil worker of BPM, managed their staffs in racial segregation into two working groups (*Minyak*, 09-1921: 11-13). The first group embraces the Europeans as the top-level working class, which includes people of European descent and the Indo-European mixed group. The second group is the Asians, which mostly consists of Foreign Orientals and Javanese workers. All Asian workers were placed in racially separated villages, such as *Kampong Jawa* and *Kampong Cina*, while Europeans were stationed in residences with adequate facilities.

In the operational system of work, oil companies stand between racial

colonial regulations and practical economic policies that benefit the company. To improve the living conditions of workers, BPM sent a petition to the Governor General in Batavia to ratify the work contract and rewrite the work regulations policy towards Asian workers. In 1910, BPM wrote to reject the abusive working conditions that occur among East Sumatra plantation workers which affect the performance of oil workers. BPM viewed the bad conditions of oil workers with concerns about the loss of human resources. There were 3 urgent matters which became the basis for the petition to the Dutch Colonial Government; amendments to the Coolie Ordinance, the details of work contracts and the abolition of labour inspectorate (*Alg. Sec. Tzg Agenda, 1891-1942 No. 6629*). BPM protects Asian oil workers by providing good wages and health insurance from departure from their place of origin to arrival at oil ports. All workers must be at least 18 years old to no more than 45 years old. They receive a fee of f15 while on board and after obtaining approval from the medical doctor (*De Sumatra Post, 30-06-1920*). They will also receive f5 upon arrival at the drilling. The working period in a day is 10 hours and get days off on Sundays, European Holidays and Islamic Holidays. If they have to work on a holiday, they will receive proper overtime pay. The workers also receive adequate housing facilities in barracks or villages, lighting and medical treatment. BPM also tried a colonization program in several areas along the oil pipeline in East Sumatra to build colonies or special settlements for contract oil workers from Java with adequate facilities (*Tijdschrift voor Economische Geographie, 1918*).

In fact, many operational work standards are oppressive to Asian oil workers. They receive a Letter of Agreement and a copy but they are prohibited from adding to or subtracting from written contractual agreements that have been determined by BPM (*De Sumatra Post, 11-05-1929*). If the workers refuse and object to the conditions, they are sent back to their place of origin. The rule of the *poenale sanctie* has strongly tied oil workers into racist contract politics which originated from the legacy of the plantation policy, where the native workers were entitled to receive violent punishment in the form of beatings, imprisonment, flogging and fines if they disobeyed colonial authorities. It was created to subjugate native workers in a paternalistic relationship with European employers. BPM and colonial government maintained the politics of racial segregation which led to conflicts and criminal cases in the oil industry. Native oil workers are closely monitored by the *arbeidsinspectie* or labor inspection body. The supervisory board consists of supervisors (*inspecteurs*), deputy supervisors (*adjunctinspecteur*) and foremen (*arbeidscontroleur*) who are stationed in Pangkalan Brandan and Palembang. Thomas Lindblad stated that the conditions of oil workers changed in each period. Efforts to improve conditions to reduce violence against oil workers failed as reports of worker protests continued to rise (Lindblad,

1999: 65). This situation indicates that oil worker conditions for indigenous people are still poor. Murders or cases of violence at oil refineries occurred between European employers and native workers. According to reports in local newspapers, several Dutch foremen were killed because of revenge or defiance from native oil workers. Attacks carried out by Javanese oil workers are often written as cases of “*mataglap*” from “*mata*” (eyes) and “*gelap*” (dark) to label criminal cases committed by native oil workers that are triggered by the psychological instability of the indigenous perpetrators where they are in a state of confusion (*Het Nieuws van den Dag*, 17-02-1931). Therefore, the colonial field police closely monitored Asian workers, including Chinese who came from mainland China.

Conclusion

The discovery of oil in the Netherlands East Indies played a major role in boosting the economic interests of the Dutch Empire, making it one of the biggest oil producers in the world during the 20th century. To facilitate its goal of establishing a colonial oil monopoly, the Dutch government encouraged the development of petroleum geology, training geologists to explore and identify oil reserves. This collaboration between the colonial state and private companies was driven by a scientific ambition to control land concessions and the oil business. Geological science underwent significant changes and evolved into a transnational scientific enterprise. It connected engineering groups in the Netherlands with the gathering of geological data from nature and indigenous knowledge in Sumatra.

The colonial oil industry had a considerable impact on rural areas, bringing about significant changes to social, economic and natural landscape. These changes were evident in the vernacular landscape created by geological investigations, drilling, and oil pipeline construction. Unfortunately, such transformations also had a detrimental impact on the natural landscape. Instead of dominating nature, geology supported the stability of natural exploitation and mobilized local worker to expand the oil industry. In the pressure of social labour within oil companies, white European groups created control over workers of colour within the structure of racial working-class divisions.

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