



Economy, Transport, and the Environment in Colonial Northwest Borneo: An Environmental Historical Perspective

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ABSTRACT

This paper studies the relationships between transport, economy, and the environment in colonial northwest Borneo. The physical environment of northwest Borneo was significantly linked to the economic changes and growing transport system. Economic activities and multiple transport networks influenced each other. During the colonial period, the British administration introduced modern steam navigation, road transportation, and railway in the region for economic and communicational purposes, which led to remarkable ecological changes. This paper shows how economic activities shaped transport systems and how this relationship between the economy and transport systems impacted physical environments in northwest Borneo.

Recent historical works suggest that the colonial transport system significantly affected the forest, wildlife, climate, land, and people of northwest Borneo. In particular, the colonial period saw an unusual extent of deforestation, which impacted the region on two spatial scales. The direct ecological impact of deforestation resulted from timber trade, rubber, and railway-road construction. At a more indirect level, the links between transport and deforestation could be found in the global expansion of transport systems and motor vehicles. Much of the rubber plantation took place at the expense of forests and catered to the need for motor tires for vehicles running in North America, Europe, and beyond. The paper, therefore, explains how market demands at regional and global levels influenced the transport networks and how those networks were built at the expense of natural resources with implications for terrestrial ecology and climate.

Keywords: Environment, Transport, Colonial, Road

Introduction

This paper explores the tripartite links between transport, economy, and the environment in colonial northwest Borneo (present-day Brunei, Sarawak, and Sabah). The economic development was mainly influenced by the extensive transport networks of the region. For centuries, the oceanic networks connected many ports and coastal areas, while for internal connectivity, river networks, and jungle paths played as main arteries. In the colonial period, transport networks flourished with modern technologies. Their extensive networks provided modes of transport, facilitated trade and commerce, connected commercial, industrial, and agricultural centers, and impacted migration, settlement patterns, and environmental transformations. British colonial northwest Borneo saw a phenomenal role of the transport networks in internal and external trade that was accompanied by a modern capitalist economic change in this region. Initially, the British ruler followed the traditional indigenous trading pattern, which relied on a water network. The old trading patterns shifted gradually into a modern capitalist economic framework. Demand for world commodities influenced the ruler to plant tobacco, rubber, and other cash crops on the riverbanks and the fringe of the railway line. Though the construction of railway and road networks contributed significantly to the colonial economy, the river network played a seminal role in this event.

The physical environment was linked to the economic changes and evolving transport system in northwest Borneo. Human enterprises and multiple transport networks influenced each other. During the colonial period, the British rulers introduced steam navigation, railway, and road transportation in the region for economic and communicational purposes, which led to remarkable ecological changes. This paper shows how economic activities shaped transport systems and how this relationship between the economy and transport systems impacted physical environments in the region.

Recent historical works suggest that the colonial transport system significantly affected the forest, wildlife, climate, land, and people of northwest Borneo. In particular, the British colonial period saw an unprecedented extent of deforestation, which impacted the region at two spatial scales. The direct ecological impact of deforestation resulted from timber trade, rubber, and railway-road construction. A more indirect level was the links between transport and deforestation that could be found in the global expansion of transport systems and motor vehicles. Much of the rubber plantation took place at the expense of forests and catered to the need for motor tires for vehicles running in North America, Europe, and beyond. These two impacts also considerably disrupted the ethnic ecology of the region. My paper explores how market demands at regional and global levels influenced transport networks and how those networks were built on natural resources with implications for terrestrial and ethnic ecology and climate. Though the environmental impact of transport networks in northwest Borneo was significant, the region's economic and environmental history has not yet fully grasped its historical significance. This paper offers a deeper understanding of the triangular relations between the economy, transport, and the environment of northwest Borneo.

Pre-colonial northwest Borneo was ruled under the Bruneian Sultanate. In the nineteenth century, the dismemberment of Brunei occurred, leading to the creation of Sarawak, North Borneo or Sabah, and Brunei. All three regions were directly or indirectly controlled by the British. The British White Rajah, the Brookes, ruled Sarawak since 1841. British North Borneo Charter Company occupied Sabah in 1881. All three territories became British Protectorates in 1888, and finally, Brunei accepted a British Resident in 1906. After the Second World War, these three regions became the crown colony of the British Empire. In this paper, the colonial period refers to a direct or indirect British reign in northwest Borneo from the beginning until the post-colonial period.

Traditional Transport and Commercial Networks

In pre-colonial northwest Borneo, the transport system was often characterized as indigenous. The natural surroundings played a vital role in the development of transportation networks. Sabah, Sarawak, and Brunei, three states in the region, were reliant on their extensive river systems and the South China Sea network (Rashid 2022). In pre-colonial northwest Borneo, the rivers were the main highways of trade and commerce, linking from the highlands or deep inside to estuaries or ports. Hugh Low, the Colonial Secretary of James Brooke, noted that there were no paths in that flat and swampy part of the island, and all communication between the people, even far inland, was carried on by boats (Low 1848, 324). Before the British colonial period, Chinese traders went to the interior region through the river network for edible birds' nests, camphor, rattans, resin, and many jungle products of Borneo Island. The early European travelers utterly depended on the rivers to reach the inner parts of the Island (Nicholl 1983; Kaur 1994). River transport was a substitute for sea vessels carrying goods into the interior. Coastal ships first transported commodities to the river ports then these goods were freighted by river boats from one river to another and the major trading ports (Kaur 1998). Prahu was used for coastal and sea transport. The different ethnic communities built and used a variety of boats, including the Pakerangan, Gobangigubang, Sapit, Dapang, and Kompit (Rutter 1922).

In the pre-colonial period, the land transport system did not develop properly for its adversity of topography. A permanent swampy environment made obstacles to movement by land. Besides, the tropical rainforest was very difficult to penetrate the interior (Kaur 1995). Although the area was naturally restricted, a few paths and jungle tracks led from one village to another and to the outer peripheries to collect forest produce. These paths connected river networks (Gudgeon 1913). There were also many bamboo-made bridges on the rivers in the pre-colonial period made by the local indigenous people (Boyle 1865). The kerbau, or buffalo, was the primary mode of transportation in British Borneo. Other than buffalo, the people relied on local ponies and bulls to get around (Evan 1915; Kaur 1994).

Introduction of Modern Transportation

i. River Transport

When the Brooke family established their control over Sarawak, primarily, they depended on water transport. Under the Brooke rule, Kuching and Sibu thrived as the main inland river ports. In early 1841, White Rajah James Brooke operated his steamship *Royalist* and *Swift* on the Kuching-Singapore line. Initially, the Brooke government maintained a small fleet of steamers and launches of variable sizes. These steamer services operated a mail-run service to Singapore as cargo and transported coal from the mines to the coastal ports. The Borneo Company Limited launched a steamer service for coastal and river transport. By 1913, six steam vessels belonging to the Brooke Government were employed in service (Gin 1995). In 1919, the Sarawak Steamship Company operated a fleet of six small cargo and passenger steamers for the river and ocean trade until the Second World War (Tregonning 1965). In 1947, numerous motorized small craft carried passengers and cargo up and down the rivers, while the Sarawak Steamship Company maintained coastal and river steamer services using their fleet (Sarawak Report 1947, 1955).

When the Chartered Company was formed in Sabah, trade networks were established with the new settlements on the Padas, Papar, and Tempasuk Rivers. By 1890, six steamers ran between Sabah and Singapore, and the other two went to Hong Kong. In addition, the Chartered Company used steamers to communicate between the coastal areas and the rivers (Kaur 1998). During the First World War, the Straits Steamship Company, a Singapore-based venture, operated a regular steamer service between Singapore and North Borneo ports. In 1927, the Sabah Steamship Company was founded to maintain weekly or fortnightly services (Kaur 1994; Kaur 1998). By the 1950s, the Straits Steamship Company operated a fleet of six coastal ships that involved a considerable part of Sabah's coastal trade (North Borneo Annual Report 1950, 1955).

At the primary stage of residential Brunei, the rivers were the chief means of communication, and the inhabitants used their local boats for transportation. By 1906, the Labuan Coalfields Company Limited maintained steamer trips to Brunei, transporting cargoes. A Brunei Government launch also served the internal trade (Brunei Annual Report 1906). Until the Second World War, the Straits Steamship Company of Singapore maintained a regular connecting service between Labuan and Brunei, Kuala Belait, and Tutong. After the war, a weekly mail and ration boat from Brunei to the Temburong district was run by the Government. At the end of the 1960s, the Colonial Government maintained a fleet between Brunei and Labuan for passenger and mail service (Brunei Annual Report 1934, 36, 1946 1960).

ii. Railway

W. C. Cowie, a British North Borneo Company shareholder, was the main initiator in introducing a railway in Sabah. He felt that the construction of the railways and economic growth were closely associated. A. J. West was appointed railway superintendent after the proposal was approved. On the west coast near Brunei Bay, railway line

construction began in 1896 to connect Sipitang with Tawau at Cowie Harbour (Kaur 1994; 1998b). Under the supervision of West, the three lines were built- (i) the 20-mile-long Weston to Beaufort line was completed in 1900; (ii) the Beaufort-Jesselton line was 57 miles and completed in 1902 and (iii) the 30 miles long Beaufort to Tenom line was finished in 1905. This last section expanded to Melalap, 9 miles away, in 1907 (North Borneo Annual Report 1947, 1948, 1949).

For more development, two Malayan experts were hired to prepare a report on the railway. According to the report, the Jesselton to Beaufort line should be renovated. Consequently, a considerable part of the 30-pound rails was replaced with 60-pound rails. By 1923, the cost of construction had increased to £800,000. (Kaur 1994; 1998b). Until the Second World War, the railway facilitated the only network between the rubber plantations areas and Jesselton and the outer region. The railway was extensively damaged during the Second World War (Kaur 1994; North Borneo Annual Report 1950; Tregonning 1965). After the war, a major restoration and reconstruction scheme was initiated at a \$480,000 estimated cost and implemented between 1949 and 1960. The main line was transformed into 60-pound rails (Kaur 1994).

The railway in Sarawak was limited and did not show its full potential. Charles Brooke built the only meter gauge railway line to link the hinterland to Kuching. Sarawak's railroad only ran for ten miles. The construction commenced in 1911 and finished in 1915. After running for almost two decades, the railway service was closed in 1933, and its total loss was \$1,063,760 throughout its operation. Later, it was operated to transport stone to Kuching from the mines located at the seventh mile (Rashid 2022 and Kaur 1995). Similarly, Brunei's railway history is virtually nonexistent. In 1924-25, the Royal Brunei Oil Company built a light 600 mm gauge railway connecting its Seria refinery (from the mouth of the river) with a water pumping station at Badas, about 9 miles (Brunei Annual Report 1925, 1938).

ii. Road Transport

In the earlier days of colonial Sabah, British officials usually used local paths that were the only land network between two destinations and connected several river crossings. In 1902, the construction of an extensive network of bridle paths was initiated by Governor E. W. Birch to connect remote outposts and densely forested areas (Rashid 2022). Road development initiatives grew significantly with the arrival of the Governor, J. L. Humphreys, in 1926. After a detailed survey, Humphreys initiated a ten-year road construction project at an approximate cost of £25,000 (Kaur 1994). As a result, 241 miles of metalled and earthen roads and 600 miles of bridle paths were constructed by 1940. In 1948, a road development project commenced, which included proposals for four new road networks of 149 miles. Between 1881 and 1954, 300 miles of roads were constructed in Sabah. Governor Roland Turnbull did it twice between 1954 and 1957 (North Borneo Annual Reports 1949-57). (See Table 1).

Table- 1 Mileage of Various Type of Roads

Year	Bituminous Surface	Other Metalled	Earth / Gravel	Bridle Paths
1955	209	94	345	593
1956	225	118	359	492
1957	217	148	345	400
1958	217	78	427	389
1959	230	70	463	453
1960	233	80	456	471
1961	238	112	578	471
1962	243	221	590	471

Source: North Borneo Annual Report 1962.

When White Raja James Brooke occupied Sarawak, land networks did not exist in the region. The only roads for communication were jungle paths diverging from the towns (Sarawak Annual Report 1947). The Brookes had no interest in developing road transportation. The administration built short roads connecting various locations in the major localities (Rashid 2022). The Third Rajah Vyner Brooke initiated a new road-bridle path construction policy. Through this initiative, the construction of 120 miles road from Kuching to Simanggang was started to open agricultural territories in 1928 (Sarawak Annual Report, 1947-48). Due to a shortage of funds, this project was not successful. Only the Kuching-Serian Road, a forty-mile stretch, was built in 1940 (Rashid 2022; Kaur 1995). After the Second World War, road development projects had got new momentum. A total of 847 miles of road were constructed by 1962 (Sarawak Annual Report 1962). (See Table 2).

Table-2 the Road Type and Mileage from 1958 to 1962

Year	Mileage			Total Miles
	Width over 12 ft.	Width 12 ft. — 8 ft.	Width under 8 ft.	
1958	283.57	220.53	52.59	556.69
1959	282	224	99	605
1960	603		102	705
1961	300	349	99	748
1962	351	387	109	847

Source: Sarawak Annual Report, 1958-1962

There were no roads in pre-Residential Brunei, only rough tracks or jungle paths used by the people in carrying their goods to markets held occasionally at suitable places near the local inhabited areas (Horton 1985). M. S. H. McArthur, the first resident, had initiated reforming Brunei's administration and infrastructure development. In his time, the first road was built, connecting the old British Consulate to a square behind Kampung Ayer (Brunei Annual Report 1906). In 1914, a 60 miles road construction under the pilot scheme was initiated to connect Brunei Town and Kuala Belait. In 1934, the total number of roads throughout Brunei had increased to 68 miles (Brunei Annual Report 1937; Horton 1985). There were 102 roads by the Second World War, and the number of vehicles on the road increased. The British Malayan Petroleum Company built and maintained all of them (Sidhu 1995). The growth rate of the road mileage increased year by year, and at the end of 1953, there were almost 160 miles of roads in Brunei, of which about 60 miles were constructed and kept by the BMPC, mainly in the Seria-Kuala Belait areas (Brunei Annual Report 1953).

Economic Impact

i. Colonial Economy and Commercial Networks

Colonial rulers brought a massive economic transformation to northwest Borneo. In the early nineteenth century, the forest products of northwest Borneo drew a magnificent attraction among the capitalist trading companies, which resulted in the transformation of the indigenous economy into a global economy. From the second half of the nineteenth century, another change took place in the production pattern, which was increasingly shaped by the demands of the world commodity market of tobacco, rubber, timber, and oil (Cleary 1996). Commercial cultivation expanded, which led to the opening of vast areas for cultivation. The significant development of transportation in this period provided the trade networks from the inland centers of production to the ports that also opened an once terra incognita to the rest of the world.

At the initial stage of colonial Sabah, the river networks played a significant role in expanding two major export commodities, tobacco, and timber. By the last quarter of the nineteenth century, tobacco began planting in Sabah. Most of the plantations were situated on the riverbanks, where the soil was fertile for its cultivation and made easy access to their river networks (Rutter 1922; John and Jackson 1973). When tobacco plantations collapsed in the early twentieth century, timber took its place and continued economic activity on the east coast of Sabah, located on the great river systems there on the port of Sandakan, Lahad Datu, and Tawau (Kaur 1998). Many Companies established steam sawmills and operated export trade in rough and sawn timber, *belian*, and other heavy hardwoods (Cook 1890; Smythies 1961). Rubber plantations in Sabah brought the region into the trajectory of the international economy. The rubber plantation made its full potential on the flourishing economic activities since the 1910s.

Land transportation played a crucial role in social and economic development in Sabah. Gradually, the Company reckoned its potentiality and invested considerable money in road and railway construction. The railway facilitated the development of the interior and connected all the rubber estates. Maximum rubber estate established at the

fringe of railway line based on available railway transportation. Besides, jungle products, timber, sago, and tobacco were also dependent on railway transportation (Kaur 1994, 1998).

Adverse natural conditions and less economic benefit did not convince Brookes to initiate any big road and railway development project. After a hundred years of their rule, inland waterways remained the most significant artery of Sarawak. Most of the areas of development and important settlements were closely connected to the coast and the major rivers. The impact of poor land communications was visualized in Sarawak's economy. Many developments and initiatives of the Brookes did not cover the whole region. Transport networks that integrated the indigenous economy were primarily ignored by Brooke's government. Besides, transport development fostered an export-oriented economy and trade and commerce that sustained as main networks of jungle products, cash crop collection, and the distribution of imported commodities. When Sarawak became a crown colony, many road development projects were initiated, resulting in the rapid growth of the colonial economy (Kaur 1998).

In Brunei, water and road transport played a significant role in economic development. Before the residential period, the river remained the main artery of trade and commerce. From 1906, the residential government took many initiatives for road development. As a result, an extensive road network flourished, joining many agricultural, mining, and trading centers. This connectivity of transport networks ushered in a thriving economy of colonial Brunei.

ii. The indigenous economy and settlement

At first, the modern transport system did not have so much impact on the local indigenous economy in northwest Borneo. Roughly all materials and labor forces were imported from abroad for railway and road construction. Only timber was utilized for railway sleepers, and firewood was used as fuel. Very few ethnic people worked as part of the labor force. Gradually, the situation changed as it influenced much in many socio-economic spheres. A significant change was the gradual increase of passenger travel in road and railway transportation. Railway administrative buildings, hotels, and central workshops were built, which improved the local settlements in many areas. The railway changed the lives of the indigenous people effectively. For example, before the introduction of the railway, an indigenous person received 70 cents per picul (or pikul = 60.5 kg) for his rattan. This payment increased to several dollars when the railway connected the indigenous areas. The railway also created new jobs, such as jungle clearers, cargo supervisors, porters, and railway staff (Kaur 1994).

iii. Migration and Labor

A significant socio-economic change happened in northwest Borneo from labor migration and settlement. This change caused a considerable influx of the Chinese, Javanese, and Indian diaspora. In Sabah, Chinese and Javanese labor worked in the plantations, timber industry, and railway and road construction. This migration also interrupted

the indigenous demography. In the 1860s, the total number of ethnic people was 50,000, which was the majority in the state. By 1960, the demographic structure had altered dramatically. (Kaur 1994; Tate 1996)

Shortage of ethnic or local workforce, Sarawak had also to import Chinese and Indian labor for the economic sectors. At first, the Brookes relied on prison labor to work on various government projects. The Public Works Department severely felt the import of more labor to carry out the development projects. Gradually, Chinese, and Indian (Tamil) workers fulfilled the growing labor needs. From the beginning, the Brookes opened the region to labor migration. For example, the population of Sarawak was approximately 150,000 in 1857, and twenty years later, it had increased to 222000 (Kaur 1995).

Environmental Impact

In northwest Borneo, the colonial rulers brought a significant economic transformation. Land use for cash crops cultivation increased, which led to more land for preparation. In addition, the use of a great portion of land for railway and road development also intensified. As a result, massive deforestation happened by the requirement of land for agriculture and transportation and for the exploitation of timber resources. The physical environment of the deep interior also changed from tropical rainforest to agricultural estates. At the same time, transport development and cash crop cultivation disrupted ethnic ecology.

i. Deforestation

Deforestation in northwest Borneo was increasing high during the British colonial era. Behind this deforestation, the role of timber trade, new land for cash crops cultivation, and railway, road, and bridle path construction were very noteworthy. Though northwest Borneo had a relatively slow expansion of railways and roads until the 1960s, considerable deforestation happened using a vast area for road and railway line construction. Another direct impact of deforestation was the timber trade. The link between timber and transportation was the *bellian* or ironwood trade. This timber was used mainly for making railway carriages, railway sleepers, and other vehicle frames and bodies. In the colonial period, a considerable amount of *bellian* was exported to India and China (Timber in British North Borneo 1915; Smythies 1961). In addition, firewood was often used for railway energy.

The indirect impact of transportation on forests was the massive land use for rubber plantations in northwest Borneo. This connection could be found in the global expansion of transport systems and automobiles. It was not until the early 1900s that rubber was planted in northwest Borneo, and it immediately developed as a major industry. Motor tires for automobile industries in North America and Europe needed plenty of rubber plantation, much of which was carried out at the expense of natural forest resources (Rashid 2022). Rubber's expansion in northwest Borneo was remarkable. Particularly in Sabah, it was phenomenal. When rubber plantation started in 1902, only 40.5 ha of land was used for it, and sixty years later, that number had risen to 69607 ha (Kaur 1994; 1998b). Such massive land requirements led to huge deforestation in northwest Borneo.

(See Table 3).

Table 3 Land Requirement for the Rubber Industry, 1902-1960

Year	Area (ha)	Year	Area (ha)
1902	40.5	1947	50586
1907	1306	1950	50586
1910	5971	1955	49451
1915	12564	1956	51993
1920	20989	1957	54694
1925	28516	1958	60279
1933	46993	1959	65310
1939	53169	1960	69607
1940	53812		

Source: Rashid 2022.

On the other hand, Sarawak also saw unprecedented deforestation in the colonial period with the expansion of the rubber industry. The Poak Concession was on an area of about 3,000 acres and began the cultivation of Para rubber in 1902. When rubber prices increased rapidly, rubber farming became extremely popular. As a result, many Western companies invested in the Para rubber farming industry (Rashid 2022; Kaur 1998a). Throughout the 1930s and 1940s, Sarawak's rubber industry flourished remarkably, with 30000 hectares of land being cultivated by 1930, 97000 hectares by 1940, and 148000 hectares by 1961 (De Jong 2001). For Brunei, a small part of northwest Borneo, many rubber estates were established during the residential era in the forestry region of Temburong district, Gadong, and Kumbang Pasang or Berakas. (Horton 1985). These establishments also caused huge expenses of deforestation.

ii. Change in Ethnic Ecology

Transport development in northwest Borneo very often distorted the ethnic ecology. The advent of the railway and the development of rubber estates associated with each other led to the opening of vast areas for cultivating cash crops and railway lines. These two developments significantly changed the economic as well as ecological landscape of the region. These advancements altered the indigenous setup of the land and violated the customary right of the ethnic people who lived and cultivated their land in those vicinities.

Case Study: When railway lines and rubber estates were established in the Papar region in Sabah, the Dusun people faced the double threat of rubber estates and the railway. The Dusun saw that some of their lands were forcefully captured from them, either by the government or the estates. These lands were previously kept or used by the ethnic

community for graveyards, grazing, and gathering and planting fruit trees (Wong 2012). Negative feelings and agitation were increasing significantly so they first appealed to the owner of the estates for remedial action. But the owners constantly denied considering their appeals (Rutter 1922; Wong 2012). After that, they made several complaints to the Company's administration. Initially, the administration took some measures to compensate the Dusun people that were insufficient. The Dusun remained unhappy with such actions. In 1910, the Dusun united and submitted a petition to Sir John Anderson, the High Commissioner for the Federated Malay States and British Borneo, and the Governor of Singapore. Later, an English lawyer, R.B. Turner, engaged in this petition on behalf of the Dusun to seek remedy for their plight. (Wong 2012).

In the petition, some points were mentioned that the rubber estate had obtained land from the Chartered Company without their concern. The rubber company destroyed fruit trees and did not pay compensation. The rubber company had breached its customary rights by clearing lands that were graveyards and burial jars (tajau). The Chartered Company had failed to keep the Dusun's rights. They claimed that the loss of their lands and fruit trees caused the loss of their sources of income. One of the important points mentioned in the petition was that the Dusun had no intention of selling their lands to rubber or other plantation companies. Finally, the petition sought Sir John's help to set up a royal commission to investigate the problems and make solutions (Wong 2012). After getting permission from Sir John's office, the Dusun launched a lawsuit against the Charter Company. Though the outcome of this incident was not in favor of the ethnic people, their efforts made a more careful attempt to revise the Land Law of the Chartered Company. The new Land Ordinance was passed in 1913. The new law ascertained a more sensitive attitude toward ethnic rights (Wong 2012).

This incident referred to many ecological implications, such as the transformation of community land into commercial land, violation of the customary land right of the ethnic people, deforestation by land clearing for cultivation, cutting fruit trees, which were earning of the ethnic people, destroy of the grazing lands, which were feeding ground for cattle and other domestic animals and those who were living near the railway trucks, ousted from their ancestral residents. All these changes happened through the development of transport networks and rubber plantations.

Reflection

From earlier times, the maritime network facilitated ports and coastal areas of northwest Borneo. The river network and jungle paths connected the deep interior with the coastal region. From the beginning, trade and commerce were operated by its extensive river and sea networks. In the colonial period, rulers used these inherited transport networks. When the old system could no longer manage the additional extraction of resources, rulers introduced modern steamships, railways, and motor vehicles. In colonial northwest Borneo, transport networks were the main arteries for socio-economic development. They provided a commercial chain to carry jungle products, timber, and cash crops, like rubber, tobacco, sago, etc. They also facilitated people's movements everywhere. The new

plantations were established on the fertile riverbanks or on the railway line, which benefited from both networks by trading its production.

The introduction of the colonial administration and the modern capitalist economy brought a paradigm shift in the economy of northwest Borneo. The traditional indigenous economy changed into the global economy. The demands of the world commodity market of tobacco, rubber, timber, and oil shaped the production pattern. Initially, the modern transport systems did not so much affect the local indigenous communities. Gradually, railways and road much influenced the indigenous people. Labor migration and settlement influenced the growing economy of northwest Borneo, which resulted in a significant migration of Chinese, Javanese, and Indians. These changes eventually interrupted the indigenous demography.

The natural environment was deeply linked to economic changes and developing transport systems in northwest Borneo. Economic growth and transport networks impacted each other, which led to massive environmental changes as the colonial period faced the mass destruction of forests and ethnic ecology for rubber cultivation or infrastructure development. The region's geographical layout could be modified as needed with these developments. As a result, British rulers often altered the topography to build modern railways and roads and converted the forestry region into cultivated land. The incident in the Papar region indicates many ecological changes, such as the abuse of customary rights, the capture of communal land, the cutting of fruit trees, the destruction of grazing lands, and the ousted of their ancestral residents. All these transformations occurred through modern transport networks and the rubber industry.

References

i. Archival Documents

Brunei Annual Report, 1906, 1931, 1934, 1936, 1937, 1946, 1947, 1960

North Borneo Annual Report, 1950, 1955, 1962

Sarawak Annual Report, 1947, 1955

Sarawak Gazette, 30 September 1961

Sarawak Gazette, 28 February 1965

ii. Secondary Sources

Boyle, Frederick. (1865). *Adventures Among the Dyaks of Borneo*. London: Hurst and Blackett, Publishers, p. 49.

Cleary, Mark C. 1996. "Indigenous Trade and European Economic Intervention in North-West Borneo c. 1860–1930." *Modern Asian Studies* 30 (2): 301-324.

Cook, Alex. 1890. "Notes on the Recent Development, Explorations and Commercial Geography of British North Borneo". *The Journal of the Manchester Geographical Society*. 7: 63-75.

Evans, Ivor Hugh Norman. 1915. "North Borneo Markets." *Man*. 12: 23-25.

- Gin, Ooi Keat. 1995. "An Economic History of Sarawak during the Period of Brooke Rule, 1841-1946." PhD diss., University of Hull.
- Gudgeon, L. W. W. (1913). *British North Borneo*. London: Adam and Charles Black, pp. 36-37.
- Horton, Anthony Vincent Michael. 1985. "The Development of Brunei during the British Residential Era, 1906-1959: a sultanate regenerated." PhD Diss. University of Hull
- John, David W., and James C. Jackson. 1973. "The Tobacco Industry of North Borneo: A Distinctive form of Plantation Agriculture." *Journal of Southeast Asian Studies*. 4(1), 88-106.
- Kaur, Amarjit. 1994. "'Hantu' and Highway: Transport in Sabah 1881-1963." *Modern Asian Studies*. 28 (1): 1-49.
- Kaur, Amarjit. 1995. "The Babbling Brookes: Economic Change in Sarawak 1841-1941." *Modern Asian Studies*. 29 (1): 65-109.
- Kaur, Amarjit. 1998. *Economic Change in East Malaysia Sabah and Sarawak since 1850*. Basingstoke: Palgrave Macmillan.
- Low, Hugh. 1848. *Sarawak; Its Inhabitants and Productions: Being Notes During a Residence in That Country with His Excellency Mr. Brooke*, London: Richard Bentley.
- Nicholl, Robert. 1983. "Brunei Rediscovered: A Survey of Early Times." *Journal of Southeast Asian Studies*. 14 (1): 32-45.
- Rashid, Md Mamunur. 2022. "Development of Modern Transport System in the Bengal Delta and British Borneo: A Comparative Environmental Perspective, 1850-1963." *Southeast Asia: A Multidisciplinary Journal*, 22 (1): 61-78. <https://fass.ubd.edu.bn/SEA/index.html>
- Rutter, Owen. 1922. *British North Borneo: An Account of its History, Resources, and Native Tribes*. London: Constable & Company Limited
- Sidhu, J. S. 1995. *Sejarah Sosioekonomi Brunei, 1906-1959* (Socio-economic History of Brunei, 1906-1959), Kuala Lumpur: Dewan Bahasa & Pustaka.
- Smythies, B. E. 1961. "History of Forestry in Sarawak." *Sarawak Gazette*, 30 September.
- Tate, D.J.M., 1996. "Planting in nineteenth century Sabah and Sarawak." *Journal of the Malaysian Branch of the Royal Asiatic Society*. 69(1 (270): 37-63.
- "Timber in British North Borneo." *Journal of the Royal Society of Arts*. July 9, 1915.
- Tregonning, Kennedy Gordon. 1965. "A History of the Straits Steamship Company." *Sarawak Gazette*. 28 February.
- Wong, D.T.K. 2012. "The Papar Land Protest, 1910-11." *Journal of Southeast Asian Studies*. 43: 422-440.