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Historicising Electrification and Mechanisation on the Jos Plateau Tin Fields, Nigeria, 1902-1960

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Abstract

Cassiterite, commonly called tin ore, was of unquantifiable importance and uses during the early industrialisation era in Britain and America. This stemmed from its non-corrosive properties. It was used as a coating material, in the production of tin cans, cutleries and the manufacture of machines and electrical gadgets, among others. Hence, the demand for tin ore was very high and almost inelastic. The British colonial government embarked on an aggressive foreign policy to enable it have unfettered access to tin deposits in any part of its colony in particular, and the World in general. Plateau State, Nigeria is blessed with huge deposits of tin ore and columbite, among other natural minerals. Therefore, tin ore was the major consideration in the British's conquest and subjugation of the Jos Plateau people. Tin mining was both human and capital intensive. The pre-colonial inhabitants of the Jos Plateau i.e. the Berom people used crude methods and technology in their tin mining and smelting activities, which only produced a small quantity of tin used on a subsistence basis. However, the intrusion of British colonialism opened up a new vista in tin mining activities on the Jos Plateau. It widened the scope and introduced modern technology to the tin mining activities. This also commercialised tin production. The major focus of this article is research into the history and developments that led to the electrification and mechanisation of the tin mining fields on the Jos Plateau. It is disclosed that the electrification and mechanisation of the tin mining activities was a great step that gave a boost and enhancement to the large quantity of tin output in this area. The writing of this article adopts a qualitative approach to the collection, study and interpretation of data.

Keywords: Jos Plateau, tin, Berom, mechanisation, multinational companies, electrification

Introduction

Tin played a major role in the early industrialisation process in Europe and America. It was used in the manufacture and coating of packaging materials for consumable goods i.e. tin cans and tubes, which were used to package food for the soldiers at the war front during the First and Second World Wars. It was also used for non-consumable goods i.e. electrical wires and fittings, mechanical engines i.e. jet and train engines and in the manufacture of military hardware. These uses caused tin to be at a very high demand at the international market. Britain was the highest supplier of tin at the international market, while America was the highest consumer of tin in the world (Warshow, 1927: 483). To meet up with the high demand for tin, the British colonial government resorted to its existing colonies and the acquisition of new ones for the supply of tin ore, columbite and sundry natural minerals.

There was the discovery of huge deposits of tin ore on the Jos Plateau in 1902 by the Mining Engineer called George Nicolaus who was sent and sponsored by the British multinational company called the Royal Niger Company (RNC). This hastened the desire of the British colonial government to conquer and subjugate the people, in order to have unrestricted access to the huge deposits of tin, columbite and other natural mineral resources. It was Henry William Laws who led the expedition that successfully conquered and subjugated the Jos-Plateau people, especially the Berom people. The people put up strong resistance against the rampaging and resolute British forces, the West African Frontier Forces (WAFF), but were forced to succumb to the superior fire-power of the British forces who used the Maxim gun and other sophisticated weapons. The conquest and subjugation of the Jos Plateau ushered-in British colonial administration and an era of expansive and intensive tin mining activities. This terminated with the attainment of political independence by Nigeria in 1960.

The pre-colonial Jos Plateau people i.e. Berom people practiced tin mining and smelting activities using crude methods and technology. However, with the advent of colonial rule, they were barred and alienated from participating in the main-stream of tin mining activities through the use of legislations i.e. the crown land policy and the mineral act of 1903 and the use of military might by the British colonial government. They subsequently created a conducive atmosphere for the influx of multinational tin mining companies and rich individual European capitalists.

These transformed and opened a new vista in the history of tin mining activities on the Jos Plateau as earlier stated. The huge deposits of pure tin ore and columbite were discovered to lie underground at a depth of between 30 to 70 feet. The chunk of these natural mineral resources was situated along the river banks and on very rich arable farm land. The multinational companies and rich individual capitalists injected and encouraged the inflow of foreign direct investments (FDI). They also provided the necessary facilities i.e. power stations which became the pivot and basis for the electrification and mechanisation of tin mining activities on the Jos Plateau (Dalyop, 2019: 104). This sped up the rate of tin exploration and exploitation by making it more effective, efficient and convenient. It also facilitated the coverage of wider areas and spans of land. Therefore, the major thrust of this article is a study and disclosure of the development and processes that led to the electrification and mechanisation of tin mining activities on the Jos Plateau tin fields from 1902 to 1960.

Brief Background of the Study Area

The Jos Plateau has one of the most beautiful scenery in Nigeria. The scenic beauty of the Jos Plateau was attested to by an author and researcher called Plotnicov in the early 1960s when he went there for the conduct of a research. He stated that "the embracing atmosphere of the Jos Plateau leaves a lasting impression on the Europeans as one of the healthiest places in West Africa." (Plotnicov, 1967:30). Corroborating with the statement of Plotnicov, Madugu states that:

The Jos Plateau as the name implies is what has been described as a scenery of beauty that surpasses any other scenery in Nigeria because of the undulating nature of the land and several magnetic masses of hills, which rises to the height of about 4,000 feet to 6,000 feet respectively (Madugu, 1994: 7).

The Jos Plateau is located in the middle belt region of Nigeria. It lies between latitudes 7 degree and 11degree north and longitudes 7 degree and 25 degree east. It has an average height of 1,200

meters above sea level (Ames, 1934:53). There are two climatic seasons in Jos, the dry and wet seasons. The dry season is usually from November of one year to March of the preceding year. While the wet or rainy season commences from April to October of the same year. There is an annual rainfall of 6 inches, which results to around 1,500 millimetres (Ames, 1934:53). There are also very good reports by the earlier Europeans who visited the Jos Plateau in the early 1900s. C.G. Lush, a renowned Mining Engineer who visited the Jos Plateau in 1909 stated as follows "the Jos Plateau enjoyed an excellent climate which is very suitable for Europeans, it has an abundance of water and is probably one of the richest tin deposit in the world" (Freund, 1981:36-37).This was a good account and report which served as an impetus and a source of encouragement to the other Europeans who had their doubts and reservations about their safety and welfare. It is so because Africa was stigmatised as a *Whiteman's grave* where diseases like malaria abound, and that the people were savages, wild, atavistic and carnivorous.

The geographical centrality of the area was studied by Bingel, who concluded that Jos is 1,000 kilometres north-east of Lagos, 400 kilometres south of Kano, 900 kilometres north of Port Harcourt, 600 kilometres south-west of Maiduguri and 1,000 kilometres south-east of Sokoto (Bingel, 1978:1). As earlier stated, Jos has one of the best climatic conditions in Nigeria. Therefore, the Europeans and others alike found it very conducive and habitable. It has an average daily temperature of 72-degree Fahrenheit. In the dry season, humidity is low and the temperature drops to as low as 59-degree Fahrenheit between December and January. However, the temperature rises up to 78-degree Fahrenheit between March and April to usher in the rainfall (wet) season. When the rainfall has properly set-in, the temperature usually drops to about 69-degree Fahrenheit between July to August (Davies, 1948:25-27).

Although the Jos Plateau is located in a tropical region of the world, it has a near temperate climate which makes it one of the coldest parts of Nigeria. The vegetation of the Jos Plateau as posited by Madugu (1994), was an area clad in rich savannah wood-land. But the vegetation at present is treeless and preponderantly that of harsh terrains and abandoned tin mining ponds and sand dumps caused by the colonial tin mining activities.

Pre-Colonial Tin Mining Activities

Excavations carried-out among the Nok people, who are neighbours with the Jos Plateau people, revealed the discovery of tin beads smelted by them, which testifies to its antiquity (Fagg, 1959:288-293). The indigenous Jos Plateau people i.e. the Berom people, were into tin mining and smelting during the pre-colonial era. Being an era of inter-ethnic wars, the Jos Plateau people were very protective and did not allow people from outside their communities to participate in the tin mining activities. They carried-out their tin mining activities around the river banks where the tin deposits were rich and alluvial in nature, using crude technology (Zang, 2017: Oral Interview). MacDonald quoted in Grace (1982) noted in 1890 that:

There is considerable trade done here in tin, which is collected by the natives in the streams which come down from the hills, they melt it down and bring it for barter in the shape of wire about half the thickness of one's little finger. The tin is of very good quality (Grace, 1982:179).

The statement by George MacDonald is a confirmation of pre-colonial tin mining activities in and around the Jos Plateau. The protectionism of the Jos Plateau people ensured that they maintained the monopoly of tin excavation. They mined and smelted their tin which they traded-by-barter with

merchants outside their jurisdiction. The crude technology used during the pre-colonial times involved the washing of the tin using a calabash. The tin was poured inside the calabash and washed several times with water. During the process of washing, the heavier tin ore settled down at the base of the calabash. The traditional process of tin smelting also involved the use of crude technology. Some of these crude tin smelting sites were located in Berom villages of Du, Bisichi and Kabong (Zang, 2017: Oral Interview).

Grace (1982) described the pre-colonial tin smelting furnaces as being vertical and made out of a mixture of building mud and dried grass. The tin was placed inside the furnace after being mixed with powdered charcoal. Bellows made of tanned goatskin were used to raise the temperature of the fire to a smelting point. The blast of air from the bellows were directed to the fire along passages made out of clay and goat hair. The molten tin ran out of the furnace along shallow trough to a hemispherical hole in the ground, which served as a mould. The tin was further refined by re-heating. Tin was mixed with other elements like iron to produce items like nose-rings, ear-rings, hand and leg bangles, necklace, among others.

Electrification and Mechanisation of the Jos Plateau Tin Fields

The instruments which facilitated the commencement of the colonial and commercial tin mining operations on the Jos Plateau were the Land Proclamation Act of 1902 and the Mineral Act of 1903 initiated by Lord Frederick Lugard (Shenton & Freund, 1978:14). Lord Frederick Lugard was the first Governor-General of Nigeria when it came under the British colonial rule. According to the Land Proclamation Act as maintained by Girouard, all lands in northern Nigeria had become the property of the British and is therefore owned by them through the right of conquest (Shenton & Freund, 1978:14). By this, the Governor-General had the right to acquire any free-hold land when required through the concept of the crown land (Goshit, 2001:75). This was the concept that the British colonial government used to confiscate the land of the Jos Plateau people after it was conquered. The Mineral Act of 1903 was specifically meant to control and regulate the manner in which prospecting for minerals and leases could be obtained within the context of the Land Acts of 1902 (Goshit, 2001:75).

The first multinational expatriate tin mining company to establish its presence and initiate tin mining activities on the Jos Plateau was the Royal Niger Company (RNC) (Freund, W. 1981:76). The RNC enjoyed monopoly and accessed quite a large number of Exclusive Prospecting Rights (EPL) over the richest tin grounds. The company also collaborated with the Colonial State to dominate, terrorise and subdue the Jos Plateau people. The people were coerced into accepting the reality of the presence of European tin miners (Freund, W. 1981:76).

By 1910, additional multinational mining companies entered the tin mining business on the Jos Plateau. Some of these mining companies were the Bisichi Tin Company (Nigeria) Limited, Ribon Valley (Nigeria) Tin fields Limited, Champion Tin Fields, Jos Tin Area (Nigeria) Limited, Kaduna Syndicate and Northern Nigeria (Bauchi) Tin Company (Fell, 1939:248). In the same year, the presence of speculative and productive capital on the tin minefields encouraged the construction of a light railway (Freund, W. 1981). The railway became known as the Bauchi Light Railway which had 30 inches gauge. The name connotes the fact that the Jos Plateau was known as the Bauchi-Plateau by the colonial government (the railway was not connected to Bauchi town). It was completed as far as Rahama (Saminaka) by March 1912, reached Jos in July 1914 and Bukuru by December 1914 (Federal Department of Antiquities, 1964:11).

The rail line continued to progress until Jos was linked to the Port Harcourt rail line in 1927 by standard gauge. When the rail line finally closed in 1957, some of the tracks and line-side apparatus as well as two locomotives and three carriages were donated to the Jos Museum to form the basis of a collection of artefacts connected with the development of the tin mining industry on the Jos Plateau (Federal Department of Antiquities, 1964:11). However, by 1913, 120 tin mining companies had a paper investment of £6.8 million in the Nigerian tin venture. Some 200 companies had invested the sum of £10 million by 1914 (Freund, 1981:38).

A new vista was opened in the history of tin mining exploration and exploitation on the Jos Plateau as tin mining activities progressed. This was the entrance and formation of bigger multinational tin mining companies. Some of these companies included the Amalgamated Tin Mines of Nigeria (ATMN), Rayfield Tin Company and Excellent Land (Ex-land) (Freund, 1981:118). These companies widened the scope and horizon of tin mining activities on the Jos Plateau, as new grounds were opened up in the interior villages. It is pertinent to point out here that most of these multinational tin mining companies were formed under the auspices of the Anglo-Oriental Group. It had its origin in the transactions and merchant dealings of John Howeson, who initiated a close-knit collaboration among valuable British finance and capital sectors. The 1920s tin boom attracted more activities of the Anglo-Oriental into the Jos Plateau tin mines (Hillman, 1988:239). Anglo-Oriental played a significant role in rationalising production, by ensuring increased management efficiency and rise in productive capacity equipment facilitated by bigger units (Hillman, 1988:239). Anglo-Oriental brought in foreign direct investment (FDI) as well as heavy machinery and plants which mechanised the tin exploration and exploitation.

Tin prospecting on the Jos Plateau had revealed that there were very huge deposits of tin ore and columbite that were between 30 to 70 feet below the ground. Hence, the over-burden had to be removed before the tin ore and columbite could be accessed. This brought to the fore the need for the electrification of the mining activities so that heavy mechanical, electrical and earth moving machines could be used. The Northern Nigeria (Bauchi) Tin Company took the first initiative in 1917 to construct a hydro-electric power station by obtaining an option from Lord Lugard. The power station with a two (2) mega-watts capacity was constructed at Kwall, in the present day Bassa local government area and had its rapid from the Gyel River. The power station was completed in July, 1923 (Simpson, 1969:241).

The successful provision of electricity to the tin fields set up the appropriate condition for the inflow of capitalist blocs who were interested in controlling the production of tin on the Jos Plateau. The Anglo-Oriental, a trust formed by John Howeson in Britain was the candidate that was successful in acquiring the largest shares of tin production and invariably taking total control over tin production. It is pertinent to state the fact that Howeson's Anglo-Oriental had the centrality and sphere of its activities and operations in the World's largest tin producing British colony of Malaya (Malaysia). The Anglo-Oriental group of companies controlled one third ($1/3^{rd}$) of the Malayan tin production in the late 19^{th} Century (Hillman, 1988:239).

The entrance of the Anglo-Oriental group of companies into the tin mining activities on the Jos Plateau was in 1926, when it bought out some locally existing multinational companies i.e. Jarawa Tin Dredging Company Limited and the Juga Valley Company, and conjoined them to form the Amalgamated Tin Mines of Nigeria (ATMN). In 1927, the Northern Nigeria (Bauchi) Tin Company which had successfully constructed the electric power station in Kwall was also bought over by the Anglo-Oriental group of companies along with the power station. Therefore, the

purchase of the Northern Nigeria (Bauchi) Tin Company and its power generating station gave 40% of tin mining production on the Jos Plateau and 90% of electricity control into the hands of the Anglo-Oriental group of companies (Freund, 1982: 12).

The ATMN was the biggest and strongest among all the tin mining companies that explored and exploited tin, columbite and sundry natural minerals on the Jos Plateau. In fact, the ATMN of Nigeria benefitted from the tin boom of the 1930s. The company eventually became the single largest company that was involved in tin mining activities in the World between 1930s to the 1950s (Freund, 1982:12). The company's resources, wide coverage, profit margin and technical strength were further pulled together from the amalgamation of ten (10) different companies in January, 1939 (This Is Jos, 1987:15).

By the merger, these companies also hoped to reduce the cost of production, maximise output and increased profit margin. The ten (10) different companies that were pulled together to strengthen the ATMN in 1939 were A.A Davidson, Keffi Consolidated Tin Company, Kaleri Tin Mines Limited, Karre Tin Company Limited, Koshe Tin Company Limited, Kuma Tin Company Limited, Kwapa Tin Mines Limited, East Ropp Tin Company Limited, Tin Location Limited and Western Nigeria Tin Mines Limited (Adapted, 2017).

Furthermore, an increased mechanisation and industrialisation required a corresponding increase in the demand for power and electricity. The hinter-land location of the Jos Plateau made the cost of the importation of coal and oil very expensive and a 'herculean' task. To meet up with the increasing demand for electricity, the Nigerian Electricity Supply Company (NESCO) was formed in 1929 as a private company. NESCO built a hydro-electric station at Kurra Falls and also took over the Kwall electric station in the same year (Simpson, 1969:241). By 1939, NESCO was generating more electricity than the rest parts of the whole of Nigeria. However, the largest percentage of the electricity was consumed by the tin mining industry on their machines and plants, mining camps and in the residents of the European executives and miners (Simpson, 1969:241).

However, one of the most significant changes was the electrification and mechanisation of tin mining activities as earlier stated. Heavy machines and plants were introduced in the mid-1920s because of the availability of electricity. Some of the individual multinational company ownership of machinery and plants are shown on Table 1.

Table: 1. Tin mining companies and their individual machinery and plants

Plant and Machinery	ATMN Ltd.	Ex-Lands Nig. Ltd	Kaduna Prospectors Nig. Ltd	Gold and Base Metal Mines of Nig. Ltd	Bisichi Nig. Ltd
Draglines	Northern Areas, Sabon Gida 4. Southern Areas (Ladi & Ropp) 3 7	2 Lima Draglines 2	43RB 30 RB 2	1 Lima 603 at Delimi 1MF 50 also at Delimi 2	-

Bucket wheel Excavator	2 at Sabon Gida	-	-	-	-
Gravel Pump	Northern Areas 11 Southern Areas 14 25	2,10in electric gps 2, 8in electric gps 3,6in Diesel gps 5, 8in Diesel gps 1, 4in Diesel gps 13	2, 6in (one warman Diesel gps) 1, 4in gps 3	19 pressure pumps and 22 Gravel pumps 41	-
Bucket Dredge	1	-	-	-	-
Bull-dozers	10	3 D6 Tractors 3	-	3 Cat D6, 2 at Delimi, 1 at Jema'a	-
Pushers	3	-	-	5 MF Tractors and Trailers	-
Scrappers	12	1 Pullman scraper	-	-	-
Graders	3	1 whitelock	-	-	-
Euclid Loaders	1	-	-	-	-
Shovel 100 RB	1	-	-	-	-
Tin treatment plant	2	1at main camp	1 at Makafo	1 at Delimi	

Source: Mallo, S. (2008). *Minerals and Mining on the Jos Plateau.* Jos Nigeria: ACON Publishers, p. 113.

Table 1. displays the type and quantity of heavy machines and plants owned and operated by some of the major multinational tin mining companies that explored and exploited tin, columbite, wolfram, tantalite and other natural minerals on the Jos Plateau. These heavy and gigantic machines were imported in dis-assembled body parts because of their size and weight. They were then assembled on the Jos Plateau tin fields by the respective engineers of the various multinational tin mining companies (Ekwueme, 2017: Oral Interview).

The Table also depicts the fact that the ATMN, the biggest multinational tin mining company on the Jos Plateau, possessed the largest quantity of these heavy machines and plants i.e. seven (7) draglines and the only dredge operated on the Jos Plateau tin fields which was at the Berom village of Wereng. The possession and operation of these machines were both human and capital intensive. For example, it was a difficult task to move a dragline from one point to another. The path where the dragline would use must be cleared, graded and supplied with electricity, because it was powered by electricity, before it could be moved. It leaped like a frog in its movement because of its heavy size and weight (Bewarang, 2016: Oral Interview).

Figure 1. Abandoned Bucyrus Monighan Dragline at Gwoll (Barkin Ladi) **Source:** Photograph by Daniel Datok Dalyop during fieldwork on 1 September, 2017

The mechanisation of the Jos Plateau tin fields invariably ensured that more people were alienated from their land. In addition, more spans of land were destroyed and devastated by the heavy machines and plants at a faster pace than the pick-and-shovel method of tin mining had hitherto done. In the same vein, research has shown that there are 1,000 abandoned tin mining ponds on the Jos Plateau with over 800 of them spread all over Berom land. (Mwadkwon, 2008:11).

Electrification-Mechanisation and the output of tin on the Jos Plateau

The introduction of heavy machines and plants greatly enhanced the efficiency of tin mining activities which ensured increase in the tonnage of tin, columbite and other natural minerals produced from the Jos Plateau tin field. This is shown on Table 2.

Table 2: Tin production from the Jos Plateau tin fields 1938-1948

Year	Tin (Cassiterite) tonnes	Columbite Tonnes	Wolfram Tonnes	Tantalite Tonnes
1938	12, 382	535	44	-
1939	13, 003	431	240	-

1940	16, 568	396	98	-
1941	16, 638	402	23	-
1942	17, 107	865	90	-
1943	17, 463	802	68	-
1944	17, 258	2, 055	28	12.1
1945	15, 482	1, 571	5	13.3
1946	14, 252	1, 550	5	1.3
1947	12, 597	1, 286	3	3.7
1948	12, 740	1, 096	3	3.7

Source: Adapted by the researcher from the defunct ATMN office at Bukuru where the Consolidated Tin Mines Office is currently situated. 3 April, 2017.

The increased generation and supply of electricity by NESCO and the mechanisation of the Jos Plateau tin fields tremendously contributed to the increase in the tonnage of tin that was produced as can be seen from Table 2 and Figure 1. There was a rise in output of tin from 16,638 tonnes in 1941 to 17,463 tonnes in 1943. This was the largest recorded quantity of tin export from the Jos Plateau. Another factor responsible for the highest tonnage was because the British colonial government had lost its highest tin producing colony of Malaya (Malaysia) to the Japanese forces during the Second World War (1939-1945). The quantity of tin output started experiencing a decline from 17, 258 tonnes in 1944 to 12,740 tonnes in 1948 after the Second World War had ended in 1945.

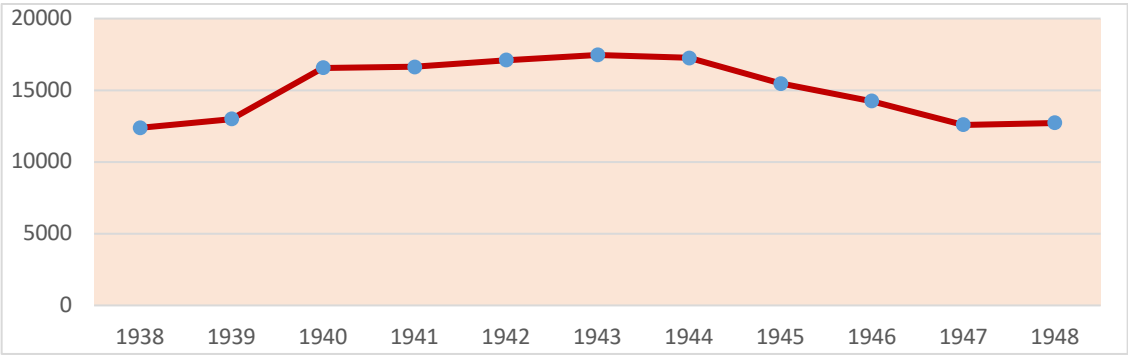

Figure: 2. Tin production from 1938-1948 Jos Plateau tin fields showing highest tonnage.
Source: Adapted by the researcher from Table 2.

Table 2 also depicts the fact that large quantities of columbite were also mined and exported. But little or no attention has been committed to the study of columbite and other natural minerals. However, the Jos Plateau tin fields were very unique and exceptional among its contemporaries.

Apart from its huge deposits of tin ore, it also had huge deposits of other metals including columbite, wolfram and tantalite which were mined simultaneously as stated earlier.

Conclusion

The electrification and mechanisation of the Jos Plateau tin fields was made possible by the influx of multinational companies and rich individual European capitalists. They heavily invested and attracted the in-flow of foreign direct investments (FDI). Mechanisation reduced the over-dependence on human labour-force to a large extent. It was very effective, efficient and reduced the cost of mining to the lowest minimum. The electrification of the Jos Plateau tin fields was the pivot on which the success of the mechanisation revolved on. It powered the tin treatment plants, heavy machines and plants i.e. the draglines operated by the companies.

However, it is pertinent to state that the mechanisation of the Jos Plateau tin fields hastened and widened the destruction and devastation of the environment. Mining ponds were excavated without concerted efforts aimed at reclamation and restoration, hence the preponderance of abandoned mining ponds. Although the 1946 Mineral Act was meant to correct this anomaly, it came too late and did too little to ameliorate or restore the environment. More so, there was no commensurate financial or material benefits from the intensive and expansive tin mining activities which accrued to the indigenous people of the Jos Plateau. They were alienated from participating in the main-stream of tin mining activities, and only worked as unskilled proletariats who were paid pittance in the form of wages. The wages were then used to pay the high amount of taxation that was imposed on them by the British colonial government. Therefore, tin mining activities on the Jos Plateau succeeded in exploiting the indigenous people of their labour-force and their natural mineral resources. These led them to a precarious situation of peasant impoverishment and penury.

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Adapted (2017, 1 September) by Daniel Datok Dalyop from the plaque placed beside the office of the General Manager of the defunct ATMN now referred to as Consolidated Tin Mines (CTM) Limited, Bukuru.

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