



Munich Personal RePEc Archive

**”Rubber will not keep in this country”:
Failed development in Benin, 1897-1921**

James Fenske

Yale University

1. November 2011

Online at <http://mpa.ub.uni-muenchen.de/35038/>

MPRA Paper No. 35038, posted 26. November 2011 16:48 UTC

“RUBBER WILL NOT KEEP IN THIS COUNTRY”: FAILED DEVELOPMENT IN BENIN, 1897-1921

JAMES FENSKE¹

ABSTRACT. Although Nigeria's Benin region was a major rubber producer in 1960, the industry faltered before 1921. I use labour scarcity and state capacity to explain why rubber did not take hold in this period. The government was unable to protect Benin's rubber forests from over-exploitation. Plantations found it difficult to recruit workers, and the government was unwilling to allow expatriates to acquire land. Colonial officials promoted the development of “communal” plantations, but these suffered due to labour scarcity and a state that was short on staff and equipment, and dependent on local chiefs.

1. INTRODUCTION

African history is littered with development projects that failed spectacularly (Bromund, 1997; Ferguson, 1990; Mackenzie, 1998). The colonial government in Nigeria's Benin region spent the first two decades of the twentieth century unsuccessfully promoting rubber production. In 1921, motivated by low producer prices and Britain's global policy of reducing rubber acreage, the Director of Agriculture wrote that his department would cease distributing seeds, since it was “not desirable that we should appear to in any way be advocating the planting of this product” (Anschel, 1965, p. 51). Though this appears at first to be simply one more botched attempt at development, it is a puzzle when set against Benin's later history. By 1961, Nigeria was Africa's largest producer of natural rubber, and the bulk of this was produced around Benin. This slow start contrasts not only with Benin's later history, but also with the rapid spread of other cash crops during the same period, such as cocoa in south-western Nigeria and Ghana (Austin, 2005; Berry, 1975). This example, then, can help explain the failures of development projects and technological diffusion in areas where the project or technology is suited to the physical environment.

Why did rubber development fail in Benin before 1921? Neither prices nor government disinterest can explain this episode. Nominal rubber prices were 17%

¹ Department of Economics, University of Oxford

Email: james.fenske@economics.ox.ac.uk

Date: November 26, 2011

I would like to thank my advisors Timothy Guinnane, Benjamin Polak, and Christopher Udry for their guidance. I am also grateful to Achyuta Adhvaryu, Gareth Austin, Prashant Bharadwaj, William Gervase Clarence-Smith, Robert Harms, Dickson Oriakhi, Benson Osadolor, Uyilawa Usuanlele, Pauline von Hellermann, Charlotte Walker and to the participants of two Yale Economic History lunches, the IAS Conference on “Understanding African Poverty in the Longue Durée” in Accra, and the Oxford African History and Politics seminar for their comments and advice. Thanks are also due to Zephyr Frank and Aldo Musacchio for providing data. Archival research for this project was made possible with support from the Coca Cola World Fund at Yale, the Georg W. Leitner Program, the John F. Enders Fund, and the Economic Growth Center at Yale. I would also like to thank Joseph Ayodokun (victoria005@yahoo.co.uk, www.nigeriaresearch.com), Monday Egharevba, and Amen Uyigüe for their valuable research assistance. In addition, I owe many thanks to Isiaka Bakare and the staff of the Rubber Research Institute of Nigeria for their considerable logistical support in collecting oral histories that are part of my larger project on rubber in Benin.

higher during the post-war rubber boom (1946-1960) than from 1900 to 1921,² but annual physical output was more than 35 times greater.³ Further, production rose steadily from 1932 to 1939, when prices were lower than in either of these periods. Before 1921, the government actively encouraged production of both wild and planted rubber.

I argue that the labour scarcity and state capacity are what constrained rubber during this period. *Wild rubber* failed because the colonial state lacked the ability to adequately monitor tapping and because it undermined existing systems of property rights, converting a formerly common property resource into open access. These problems were made worse by the region's scarcity of labour. *Private plantations* of local *Funtumia* rubber and Brazilian *Para* rubber struggled to find labour.⁴ Expatriates also confronted a colonial state that believed acquisition of land by foreigners would undermine its strategy of indirect rule. "*Communal*" *plantations* too coped with the unavailability of labour. Further, the colonial state was dependent on local chiefs who appropriated the benefits of these plantations. Short on staff and equipment, the state was unable to effectively maintain its investment or pass skills to locals. The government failed to forecast the destructive effect of Asian production on the price of rubber.

In this paper, I use archival evidence to support this explanation. The scarcity of quantitative data for this period makes it impossible to use credible counterfactuals to sort out the difficulties in Benin's rubber industry that had the greatest impact. I am able, however, to show that the key problems identified in the archival record were also present in other cases of failed rubber development. Wild rubber elsewhere in Africa and plantations in both Africa and Brazil faced many of the same problems as Benin. Further, these constraints were largely absent from Brazilian wild rubber or from plantations in southeast Asia, and had been substantially relaxed when Benin became a successful exporter of rubber after the Second World War.

I add to our knowledge of several issues. First, the slow adoption of new technologies in developing countries remains a barrier to growth. Existing studies have emphasized factors such as costly learning (Bandiera and Rasul, 2006; Conley and Udry, 2010), heterogeneous returns (Suri, 2010; Zeitlin, 2011), and fixed costs combined with present-bias (Duflo et al., forthcoming). I add to this literature by including explanatory variables that vary over time and space in their ability to delay technological change. While labour scarcity in particular is understood as an important determinant of technological change by economic historians (e.g. Allen, 2009), it has not featured largely in the more recent literature in development.

I also contribute to our understanding of state capacity and labour scarcity as determinants of development. African history provides many examples of initiatives

² Anschel (1965) gives price figures that average £153 per ton from 1900 to 1921, £179 per ton from 1945 to 1960, and £37 per ton from 1932 to 1939.

³ 25,884 tons versus 701, on average (Anschel, 1965).

⁴ By "plantation," simply mean a purposefully planted farm of rubber trees. This follows the convention of the primary sources, and does not require that the farm be large in scale or worked with hired labor.

that failed due the prejudices, ignorance, and weakness of colonial and post-colonial states. Similarly, African states have often adopted policies that hinder development in order to ensure their own political survival (Bates, 1981; Van der Walle, 2001). The colonial state in Benin lacked the knowledge and resources to directly implement and enforce its policies. Reliance on local chiefs and staff whose incentives did not match those of the state limited the effectiveness of its development initiatives. An old literature in African history suggests that scarce labour has been an important factor in the continent's development (Austin, 2008; Fenske, 2011a,b; Hopkins, 1973). Similarly, economists understand that population is crucial for development, over the long run (Acemoglu et al. 2002) and over the very long run (Galor and Weil, 2000). I show that labour scarcity hindered both labour-intensive production and the management of a common property resource in Benin.

In the next section, I provide background on rubber and on Benin. I describe my sources and how I use these to explain the failure of rubber in Benin before 1921. In the subsequent sections, I discuss wild rubber, privately-owned plantations, and the government-supported communal plantations in turn.

2. BACKGROUND AND SOURCES

The vulcanization of rubber in 1843 made it useful for hoses, tubing, springs, washers, diaphragms, and other industrial applications, spurring demand that was accelerated by the later spread of bicycles and automobiles (Harms, 1975). Before Asian supply lowered world prices, Africans exported wild rubber to meet this demand. The largest African exporters during this period were Angola, the Congo Free State, the French Congo, French Guinea, and the Gold Coast. I focus on rubber production in the area surrounding the Edo-speaking Kingdom of Benin, centred on the Benin District of colonial Nigeria. In 1897, following the massacre of an expeditionary party, Britain sacked Benin.

Though rubber was important to Benin's late colonial economy, the industry has received little historical notice. Ansel (1965) and Blanckenburg (1963) describe the industry as it was in the 1960s. Afigbo (1970), Egboh (1985), Igbafe (1979) and Usuanlele (1988, 2003) each give a few pages to rubber in their broader studies. I add to these accounts, using colonial annual reports, records of the West African Lands Committee (WALC), and correspondence from the National Archives of the United Kingdom (NAUK) in Kew and the National Archives of Nigeria in Ibadan (NAI).

I am constrained by these sources to use a mostly qualitative analysis. Excepting total rubber exports from Nigeria, there are no systematic data available for rubber in Benin.⁵

⁵ For example, the *World Rubber Statistics Historic Handbook* is the main source used by Frank and Musacchio (2006). For Nigeria, it reports exports with only a single significant digit, which is less precise than the annual series in Ansel (1965). It does not report the amount of land planted to rubber for Nigeria; neither does Ansel (1965).

Other sources of quantitative information are scattered and are not consistent.⁶ The scattered estimates that exist of the quantities relevant to rubber production are so variable that no counterfactual exercise can be credible.⁷ Instead, I examine the problems that faced the industry that are identified by colonial staff, officials, expatriates, and Africans themselves in archival correspondence. For this period in sub-Saharan Africa, almost all written sources have a colonial origin. This presents two challenges: bias and selectivity.

Colonial sources are biased. Officials highlight problems not of their own making. For example, writers might emphasize the low quality of rubber while staying silent about the labour demands created by road work. I use three strategies to remedy this. First, non-official voices are represented as a minority voice in the records. Africans' views are forwarded to colonial authorities as letters, reports from subordinate officers, and court testimonies. Expatriate planters and traders also express their views in the correspondence. These counterbalance the official narrative. Second, I draw from the existing literature to provide additional information about what is absent in the official record. Usuanlele (1988, 2003) is indispensable here. Finally, I use the comparative approach described below.

Colonial sources require the reader to select the evidence that is most relevant. Several problems with rubber are mentioned in the records. Those that were not pivotal are still a part of history, and I include them in my narrative. Still, this does not tell us which difficulties actually mattered. I rely in part on the judgments of contemporaries; if observers in several sectors of the rubber industry describe the difficulty of keeping workers as an important concern, it is likely that this was a major obstacle that participants faced. I am also able to rely on a comparative approach. I identify features that Benin has in common with other areas in which rubber failed, and features that distinguish it from areas where rubber was more successful. There are four comparisons that I use. First, I contrast Benin with other parts of Africa. Countries that experienced destruction of wild rubber and failure of expatriate plantations faced similar difficulties. Second, I contrast Benin with Asia. Many of the problems I identify were overcome in Malaya and Sumatra. Third, I compare Benin to Brazil. Brazil

⁶ For example, the annual reports do not give the same information about rubber every year. The 1909 annual report (p. 14) states the amount of revenue collected in rubber licenses. The 1908 report does not. The 1908 report states the amount of rubber produced specifically in the Central Province, but notes that this cannot be separated from the rubber produced in Northern Nigeria and shipped through the Central Province. The 1908 annual report states that there are 2,251 *Funtumia* plantations with 1,125,972 trees in the Central Province (p. 15), while no similar figure is stated in the 1907 or 1909 reports.

⁷ Take, for example, the expected yield of rubber from a *Funtumia* tree. The report on the communal plantations for 1913 (NAI, Ben Prof 2/1 BP 364 1914) gives estimates of the yields achieved per tree in the Benin City district between 1910 and 1913 of 1 oz to 1.59 oz per tree; any counterfactual revenue calculation will change by 60% based on whether the high or low estimate is used. In the same period, other plantations in Cameroon and Ilesha had reported yields of 2.5 oz and 13 oz per tree (NAUK, CO 852 515 7: Commodities Rubber Nigeria. West African Rubber Mission Report on Nigeria and British Cameroons, Appendix 2). Christy (1911, p. 193) reported that, in years 6 through 10, a *Funtumia* tree would give 4, 5, 9, 12 and 15 oz of dry rubber per year. Bell (1907) suggested that 16 oz per tree per year was normal for *Funtumia* in Uganda. There is evidence, then, to support *ex ante* expected yields per tree ranging from 1oz to 16oz per year. Similar levels of uncertainty exist for labour inputs and costs, and there is almost no information available on capital requirements or processing and transport costs.

achieved greater success with wild rubber than Benin, but suffered from a similar inability to develop rubber plantations. Fourth, Benin's later success as a rubber producer is partly explained by the removal of the restrictions I identify.

3. WILD RUBBER

In this section, I outline the trade in wild (mostly *Funtumia*) rubber that followed Britain's conquest of Benin. I begin by noting that Benin's wild rubber was one of the resources that made the kingdom an attractive prize for Britain. Soon after British conquest, non-Edo moved in and began tapping the region's trees to exhaustion. Britain made efforts to restrict tapping early on, and I use records of the prosecutions of illicit tappers to expose the difficulties in enforcing these regulations. Though amended regulations appeared initially to have stopped the problem, these eventually failed. I argue that the new government could not police over-exploitation of Benin's rubber. First, the colonial state lacked the capacity to adequately monitor tapping. Second, it undermined existing systems of property rights, and was incapable of replacing them. Other regions of Africa coped with over-tapping of wild rubber during the same period, for similar reasons. In Brazil, by contrast, property rights over wild rubber were well-defined, limiting these difficulties. Both of these problems were compounded by Benin's labour scarcity.

Conquest

Though Europeans stressed humanitarianism and the Oba's tyranny as motives for conquest, Igbafe (1970) demonstrates economic motives were important. I add to Igbafe's evidence, showing that traders and British officials noticed Benin's untapped rubber and hinted that regime change would bring these into production. In an 1892 report, the Commissioner of the Niger Coast Protectorate wrote to the Foreign Secretary that "[t]here is plenty of rubber in the country, but the natives have a great disinclination to start working a new commodity."⁸ One trader in 1896 reported that the Oba would not allow his own people to collect rubber, and turned back those who sought to open up trade (Ofonagoro, 1979, p. 149). Miller's agent at Ughoton informed the consul in 1896 that, while there was "plenty" of rubber in the country, he was unable to get a "rubber man" from Cape Coast to collect it, since he would not go far from Ughoton, having been twice "maltreated while away in the bush" (Ryder, 1969, p. 277). He added that if "Benin was under proper Government and the resources of the country properly developed ... the exports would be very great."⁹

In 1896, a Lagos man went to the Oba on the advice of the Commissioner, Moor, "with a view to asking the King to start the 'rubber' industry, the country abounding in that product." Phillips reported that the man offered presents worth more than £30, but had

⁸ NAUK, FO 2/51. Enc. in Jan 12, 1893: Macdonald to Rosebery.

⁹ NAUK, FO 2/102: 24 Nov, 1896: Phillips to Under-Secretary of State; Enc: 9 Nov, 1896: Brownridge to Phillips.

no success. He warned the Under-Secretary of State for the Colonies that his instructions “to deal with this matter by pacific means have been literally obeyed and have failed to produce the results desired.”¹⁰ In November 1897, soon after the fall of Benin, Moor reported the 25% increase in rubber exports to be “satisfactory,” adding “and I anticipate considerable increase in the future as much trouble has been taken to open up rubber production...A rich country has been opened up to the influence of civilization and trade, containing extensive rubber forests...”¹¹

Overexploitation

After the conquest, the chiefs Ologboshi and Abohun launched a guerrilla campaign against the new rulers, while the British worked to impose their authority. Amidst this confusion, the government struggled to police rubber exploitation by Yoruba and Fante tapping gangs and by the Royal Niger Company, who sought to take advantage of the change in regime. The British believed these outsiders were aiding Ologboshi and Abohun. Fosbery reported that “undoubtedly all the rubber cutters in that part of the country were in his favour, and on the day of the first engagement our men were cursed from the bush by Yorubas.”¹² Later on, he met a man called Deji, living at Isua. “This man’s residence,” he noted, “was undoubtedly the head centre of all the Yoruba rubber cutters in that part of the district; both these men were arrested, with several of their followers.”¹³

Royal Niger Company agents moved into subject towns, encouraging them to ignore British officers. Moor reported that, during the expedition against Ologboshi, arms and ammunition had “found their way into the disaffected area from the territories of the Royal Niger Company, and were no doubt exchanged for the rubber.”¹⁴ He believed there was a “a general league between the rebels, the local inhabitants, and the Yorubas who were in the territories as traders in rubber.”¹⁵ While some of this had found its way into Benin City, the majority he believed had been pushed into RNC territory, and RNC markings had been found on the guerrillas’ kegs of powder. Rubber continued to pass into RNC territory after this; the defendants in *Regina v. Akonweli, Odutala, and Ola*¹⁶ claimed to be employed by a man named Omoli, living in RNC territory, who had sent them to Ipoki to work rubber.

Intensive tapping by these outsiders raised yields but damaged the trees. In a situation that resembled open access, the predictable result was overexploitation. In 1901, the Resident recalled that it was “deplorable to see what destruction was wrought

¹⁰ NAUK, FO 2/102. 16 Nov, 1896: Phillips to Under-Secretary of State.

¹¹ Niger Coast Protectorate, Annual Report for 1896-7, p. 10.

¹² Benin Territories Expedition Correspondence 1899: Enc 4: Report on Expedition against Ologboshi and Abohun by Fosbery.

¹³ Benin Territories Expedition Correspondence 1899: Enc 4: Report on Expedition against Ologboshi and Abohun by Fosbery.

¹⁴ Benin Territories Expedition Correspondence 1899: #1: May 27, 1899: Moor to Chamberlain.

¹⁵ Benin Territories Expedition Correspondence 1899: #1: May 27, 1899: Moor to Chamberlain.

¹⁶ NAI, Ben. Prof. 8/2/1, Case Book 1898-1899.

by the foreign element some years ago around Ibewhe. Dead rubber trees can be counted by the hundred.”¹⁷ Fosberry expressed concern that the Yorubas had killed many of the local *Funtumia*, but also described his hope that the recently enacted rubber regulations (described below) would improve matters:

The bush passed through between Iho and Isure, Isua and Ihuekpe has been a very rich rubber country, but I regret to say is now full of dead rubber trees. ... The natives stated they never worked rubber, that it was done entirely by the Yorubas. I expounded the rubber regulations on every available opportunity, and urged the people to protect the riches of their country. ... This rubber has of course been a great source of revenue to Ologboshi.¹⁸

First regulations

British efforts to deal with this problem began with “makeshift” regulations, imposed in 1897 “to stop foreigners entering the Benin country for the purpose of working the economic products therein.”¹⁹ Non-Edo were required to obtain licenses from the Resident every 6 months for 10s. The regulations prohibited all persons from “tapping rubber trees in such a manner as to permanently damage them or to interfere with their future yield.” The “Chiefs of the districts” were made responsible for supervising adherence, and were to be awarded half penalties after convictions (Afigbo, 1970). Though the colonial office was unsure whether these regulations were legal, Fosberry promoted them during his operations against Ologboshi.

Prosecutions under these regulations tell us about the tappers who moved into Benin, and the difficulty of enforcement.²⁰ First, enforcement required policing by colonial staff such as forest guards. Second, these officials required cooperation from local communities. Third, tappers operated in gangs; if a few violators were caught, many would escape. Finally, the court was eager to use harsh sanctions against illicit tappers.

Monitoring required colonial staff. The defendant in *Regina v. Olowo* had been trained by the Government rubber inspector. He and four others sent out six months earlier had not been seen since. He was arrested with three others in Owedou, but three of his accomplices escaped. He and his brother worked together, the defendant selling his product “for a piece of cloth,” and his brother for 7/6. He was sentenced to one month of hard labour. Quality too needed policing. Regulations passed over the objections of European traders in 1897 allowed confiscation of adulterated rubber, with fines of up to £50 with six months imprisonment (Igbafe, 1979). In *Regina v. Osufu Jebu, Sumola, and Bakari*, the prosecution witness (a Captain) stated that he found Osufu at

¹⁷ NAUK, CO 520/7, 26/2/1901: Resident Benin City to Moor.

¹⁸ Benin Territories Expedition Correspondence 1899: Enc 4: Report on Expedition against Ologboshi and Abohun by Fosberry.

¹⁹ NAUK, CO 444/1, 5 March, 1899: Moor to Under-Secretary of State. Concerns about the legality of these regulations are cited in the margin notes in this file.

²⁰ All of the cases cited here are from NAI, Ben. Prof. 8/2/1, Case Book 1898-1899.

Udo, carrying adulterated rubber towards Lagos. The prisoners claimed they had bought it in Benin City and did not know it was adulterated. They were imprisoned with hard labour for six months.

Community cooperation was necessary. The same Captain told the court in *Regina v. Jegidi and Agbi* that, while in the same area, the residents of Obahon informed him that the defendants were cutting rubber. They claimed to be from Umapa, but “the natives of that village,” told him that they had never seen the men before. The Captain was also the prosecution witness in *Regina v. Ground Nut, Jack, and Josiah*. The defendants in that case had been arrested by the headman of Rejain with “a lot of tools etc. used for working rubber.” The Captain told the court that he had previously instructed the headman to arrest all those cutting rubber without a license. Their sentence was two years imprisonment with hard labour. In addition, the court noted that Ground Nut was a Mendi (likely Mende, from Sierra Leone) who had deserted government service.

Monitoring was made more difficult by the size of tapping gangs. The defendant in *Regina v. Thomas Ouami* was charged as the headman of a gang of illicit rubber workers. The prosecution witness, T.A. Moses, a rubber inspector, stated that he found the prisoner working rubber with a large gang of men under him. On recognizing Moses, Ouami ordered his men to escape, begged Moses not to report him to the Consul, and offered a bribe. The acting resident also considered a prior record against the defendant for obtaining money by false pretences as evidence of bad character, and sentenced him to 9 months of hard labour.

In *Regina v. Ipapa, Ehenua, Obasuye, Asaota, and Jegede*, the defendants were described as “a portion of a gang of 150 who were surprised by the Yorubas of the town working rubber near Okiewo.” They were found with rubber just collected in a calabash and rubber gouges, and were sentenced to 1 year hard labour each. The defendant in *Regina v. Jagbohun* was charged with not leaving Benin after being found guilty of “complicity with illicit rubber workers.” Ten days later, he was brought down from Isua, pleading that he was trying to catch illicit rubber workers. The incredulous Acting Resident sentenced him to six months hard labour.

Punishments were harsh. In *Regina v. Gbeson and Aburonke*, *Regina v. Adeanju*, and *Regina v. Lawojo and Omoleye*, the defendants were each sentenced to six months or one year each for “illicit rubber working” or “working rubber without a license.” By contrast, a man who stole a goat from the market to pay a debt of 8s was sentenced to 14 days hard labour, a man who three times abducted the same female slave of a chief was fined £1 and given three dozen lashes, and a man convicted of “resisting the government” was given one year of hard labour.²¹ Notably, there is only one rubber case in this book in which the defendant is acquitted.²²

The regulations were soon found inadequate (Afigbo, 1970). In October 1898, Gallwey reported that Benin was “full of rubber,” but that the Acting Resident had “continually been complaining” of the destruction of rubber trees due to “the manner in

²¹ *Regina v. Peter*, *Regina v. Bujlu* (?) *Abudu Ipede*, and *Regina v. Oriegbe*, respectively.

²² *Regina v. Osun and Abiomo*; no reason is given for why charges are dismissed.

which the natives tapped them.” The number of trees killed amounted to “no small figure.”²³ In February 1899, Moor stated that it was “utterly impracticable to preserve the rubber forests in the Benin City District unless there be a special European officer detailed for the work.” Officers had tried to deal with this, but their “enormous amount of other work” made it impossible to supervise the Native Inspectors. In his opinion, the matter was “pressing”, and “of great importance for the rubber forests in question are of very considerable extent and of great value.”²⁴

Further restrictions

In 1899, the regulations were amended. The maximum imprisonment was extended to two years, and a closed season was imposed from December to June (Afigbo, 1970). The Forestry Department was created in 1900, and its chief concern “was the preservation of the extensive rubber forests in the Benin territories.” Gallwey credited Hitchens, the Forestry Inspector, for the “very energetic manner in which he carried out this work, and for the successful efforts he made to educate the Binis to safeguard the rubber trees.”²⁵ Hitchens reported that he had inspected and assessed the value of the rubber forests belonging to nearly 100 Bini villages, and created “staffs of ex-officio rubber inspectors” in each of them.²⁶ He instructed locals in tapping, explained the regulations, and “constitute[ed] every Bini an ex-officio policeman to bring to justice any rubber gatherer infringing on the regulations.” In his view, the Bini “responded with alacrity,” exercising “such restraining influence on prohibited rubber-tapping and adulterated rubber-producing that not a single rubber gatherer is free from close ‘shadowing,’ and not a single ball of rubber and prohibited root rubber could work its undetected way to Lagos or our own trading factories.” 1900, the Forestry Proclamation was issued; this required licenses from the District Commissioner, outlined the permitted methods of tapping, and applied to all persons, not only foreigners (Afigbo, 1970, p. 390)

At first, these appeared to work. More than £700 was collected as license fees from Benin in 1900.²⁷ The Acting High Commissioner noted a fall in rubber exports in 1902, arguing timber had attracted “many who formerly collected rubber, and the legislation which has stopped the destruction of rubber trees is probably a second cause which accounts for the decline.”²⁸ In 1904, Egerton suggested the Forestry Department was “fully organized and capable of exercising an efficient control over timber cutting and, in a lesser degree, over the proper tapping of rubber-bearing plants.”²⁹

Thompson, the Conservator of Forests, wrote in 1906 in glowing terms about the license system. He felt the rubber rules were working “very smoothly” in the Central

²³ NAUK, FO 2/185; Oct 26, 1898: Gallwey to Salisbury.

²⁴ NAUK, FO 2/185; 17 Feb, 1899: Moor to Under-Secretary of State.

²⁵ Southern Nigeria Annual Report 1899/00, p. 9.

²⁶ Southern Nigeria Annual Report 1899/00, p. 9.

²⁷ Southern Nigeria Annual Report for 1900, p. 14.

²⁸ Southern Nigeria Annual Report for 1902, p. 21.

²⁹ Southern Nigeria Annual Report for 1904, p. 4.

Province, where the chiefs had taken “an active interest in protecting their forests, and the inhabitants are becoming very law-abiding in this respect.”³⁰ 1114 licenses were issued, resulting in £671 10s paid. 645 of these were given in Benin City.

The regulations were, however, ultimately unsuccessful. The Annual Report for 1908 was gloomy, stating that “[r]ubber appears to be a rapidly decaying business ... the Southern production in 1908 was 713,000 lbs. only, as compared with 1,656,000 lbs. in 1907. ... the reckless destruction of trees by excessive bleeding is largely responsible for the drooping business.” Despite this, there were only 12 prosecutions and 10 convictions under the rubber rules. The 1913 report for Benin commented on a falling off in rubber exports, blaming this on prices and “the fact that the wild rubber is much scarcer than formerly.”³¹ British regulations had not stopped resource exhaustion.

State capacity

Why did these fail? I argue that the state lacked the capacity to enforce them. First, production was difficult to police. Second, the British weakened the existing state and the local system of property rights, lacking the trust and resources necessary to replace these. The regulations diverted some of the trade from Benin to Lagos as early as 1901.³² Similarly, because Northern Nigeria had no similar regulations, rubber was smuggled to the North (Egboh, 1985, p. 57). In 1901, a representative of Miller Brothers wrote to Moor, informing him of the challenges. “Few of those who bring down rubber,” he argued, were “able to give a detailed account of its history from the time of manufacture, as it may have passed through many hands before reaching theirs.” Rubber was sold in many markets on its way to the coast, and “many of the rubber traders here are preparing to leave the district as they profess themselves unable any longer to conduct business here under the vexatious conditions in force.” Though every Edo was eligible for a reward of £2 for any conviction, the people had not looked after their own interests, in his view.³³

In 1905, the Governor recognized that prohibitions on root rubber were no longer enforced.³⁴ Christy (1911) pointed out that, while 221,566 lbs were exported from Southern Nigeria in 1907, only £53/10 was collected in license fees.³⁵ It was impossible that 107 license holders could be responsible for this quantity, so the bulk must have been illicit. Even if the forestry staff were increased fifty times, he thought it would be impossible to police the area:

So long as the native can sell his ‘lump’ rubber at an enormous profit, so long will he continue his destructive methods of tapping, and his dirty, primitive

³⁰ Report on the Forest Administration of Southern Nigeria for 1906, p. 31.

³¹ NAI, BP 138 1914: Annual Reports Benin Province.

³² NAUK, CO 520/9. 17 Oct, 1901: Acting High Commissioner to Secretary of State

³³ NAUK, CO 520/9, 13 July, 1901: McLucas and Schaumburg (for Miller Bros and Bey & Zimmer) to Moor

³⁴ NAUK, CO 520/30, 5 March, 1905: Egerton to Lyttelton.

³⁵ Though this contradicts the figure in the Annual Report, the figure in that report is larger, making the argument stronger.

system of preparation, despite voluminous rules and regulations, which he could not understand, even supposing them ever to reach himself or his chief (Christy, 1911, p. 13).

Ostrom (1991) argues that effective resource management requires defined boundaries, easy identification of those with user rights, rules appropriate to local conditions, accountable monitors, graduated sanctions, rapid and low-cost conflict resolution, and recognition of users' rights to devise their own institutions. British conquest weakened Benin's borders, rules were imposed by an external authority without local participation, colonial agents lacked accountability, and courts in Benin City were eager to impose maximum penalties.

Before 1897, Edo villages could control access to their forest resources. Outside his own village, an Edo obtained permission from the local Enogie or Odionwere to use the forest, until he settled permanently (Bradbury, 1957, p. 45). Hunters, "native and non-native" turned the hand of any animal caught to the Enogie, and the Oba was owed a leg and tusk of any elephant killed (Egharevba, 1949, p. 43-44). Non-Edo were required to settle and assimilate (Bradbury, 1957, p. 45). After 1897, outsiders came in seeking rights to farm, fish, and reap palm fruits, and the colonial government was slow to establish effective regulations to control these demands. Yoruba settlers gained land without holding title through the Oba; these were not regularized under a Native Court Rule until 1914 (Rowling, 1948, p. 11).

An 1896 editorial in the Lagos Weekly Record asserted Oba's power make "short work" of intruders, wishing that "the greedy rubber hunters" in the Lagos hinterland "should one and all be dispatched to the domains of the expeditious King of Benin" (quoted by Ofonagoro (1979, p. 120)). This was not speculative talk. Members of the British punitive expedition in 1897 found a gang of nine outsiders who had gone to Benin to collect rubber. Despite being armed with revolvers, they had been taken prisoner and held in Benin for two months, bound so they would hang themselves were they to lie down (Ling Roth, 1903, p. 68). Similarly, in February 1897, Moor reported that six "Accra men, captured in the Mahin country rubber collecting during the last few months, came in from the bush heavily ironed".³⁶

The 1908 trade report reached a similar conclusion; the situation was not adequate to protect rubber trees from destruction:

[N]ot until rubber trees are owned by individuals, who will see that they are duly protected, can this industry be looked upon as a permanent one in Nigeria. Thousands of trees in the forests, which are practically a 'no man's land,' are destroyed each year by overtapping, and although every effort is made by the Forestry Department, with the staff at its command, to regulate the gathering and to prevent indiscriminate bleeding, the task is so large a

³⁶ NAUK, FO 881/7002: Feb 24, 1897: Moor to Salisbury. Presumably, "ironed" means "in irons."

country and amidst dense forests is, it must be admitted, and extremely difficult one.³⁷

The colonial Forest Guards were inadequate and corrupt. In 1899, the defendant in *Regina v. Amidu*³⁸ was charged with seizing a government rubber inspector. The inspector came across a “large gang of Lagos rubber cutters.” The defendant captured the inspector and his two carriers, tied them up, and flogged him. The Resident complained in 1901 that the “ignorance of some of the native rubber Inspectors may also have had something to do with the failure of last year’s sowing... Three of these men have lately brought into Benin City seed in a green and half grown condition, absolutely useless and of course wasted. One would-be Rubber Inspector was a small boy about 14 who would be of about much use as a process server in Ireland of the same age.”³⁹ In 1907, Egerton noted their frequent abuses of power (not stating what these were), writing that “there are the strongest objections to the multiplication of native Forest guards with semi police powers carrying on their work in places far away from European supervision.”⁴⁰

These problems mirrored those of other wild rubber producers in Africa. The worst destruction occurred where it was impossible to keep out interlopers. In the Congo, concessionary companies were willing to make short-term profits and go bust, giving their agents incentives to over-exploit local vines (Harms, 1975). Around Lagos and Ibadan, slaughter-tapping may have been introduced by Fante workers imported by the governor (Omosini, 1979). In French Guinea, officials worried that “bandit” rubber collectors, who roamed the countryside in search of vines, were responsible for bleeding them to death (Osborn, 2004). Similarly, locals in the Ivory Coast complained that they were unable to prevent itinerant harvesters from extracting as much rubber as possible before moving on (Harms, 1975, p. 76).

Over-tapping also followed the weakening of African states. Dumett (1971) emphasizes that the destruction of rubber was less severe in Asante than around Cape Coast. Around Kumasi, tappers often obtained forest on arrangement from local chiefs, who demanded fees or shares (Dumett, 1971, p. 98).⁴¹ In Benin, the British exiled the Oba and freed many of slaves on whom the chiefs depended (Igbafe, 1975). Other political functions defined in relation to the king became meaningless. As Bradbury (1973, p. 86) puts it, “British administrators at Benin had to construct an administrative *bricolage* out of their own meagre resources of personnel and the fragments of a shattered indigenous polity.”

In Brazil, by contrast, property rights over wild rubber were well established. *Para* was largely collected from estates along rivers, owned by tappers, by patrons, or by

³⁷ Quoted in Southern Nigeria Annual Report for 1908, p. 12

³⁸ NAI, Ben. Prof. 8/2/1, Case Book 1898-1899.

³⁹ NAUK, CO 520/7, 26/2/1901: Resident Benin City to Moor.

⁴⁰ NAUK, CO 520/45: Minute Dated 12 April, 1907 by Egerton.

⁴¹ See also Arhin (1980) and Austin (2005) for rubber in Ashanti.

commercial firms (Barham and Coomes, 1994b, p. 55).⁴² The creation of rubber trails that connected wild trees helped to establish property rights over them (Weinstein, 1983, p. 158). Patrons often resided on the estates, lowering monitoring costs (Barham and Coomes, 1994b, p. 55). It was the owner who brought labour in to the estate (Frank and Musacchio, 2006, p. 277). Critically, this allowed estate owners to select the contractual arrangement by which tappers were hired. Coomes and Barham (1994a,b) suggest that the typical debt-merchandise contract was selected to minimize risks and transactions costs, and to economise on the scarcest factors of production – labour and capital. Critically, estate owners avoided rental contracts, since these would have given tappers incentives to over-tap their trees (Coomes and Barham, 1994, p. 246).

Labour scarcity

These difficulties were compounded by Benin's scarcity of labour. The population density of Benin was estimated at only 25 per sqm in 1927.⁴³ Usuanlele (1988) interprets pre-colonial land and labour institutions in Benin as consequences of this sparse population. In rubber, monitoring was made more costly by a lack of monitors. Slaughter tapping may be interpreted as another of the labour-saving production techniques used throughout Africa (Austin, 2008). I do not believe labour-scarcity alone can explain the pervasiveness of over-exploitation. Destructive tapping was employed by non-Edo, and Benin successfully prevented similar problems before 1897, despite high prices. Further, similar environmental degradation has followed even in densely-settled areas when states have undermined existing institutions – the post-colonial dismantling of common property regimes over water and forestry in Tanzania serves as an example (Sheridan, 2004).

Though Brazil succeeded in producing wild rubber despite labour scarcity, this did influence tapping methods in different sectors of the industry. Tappers who collected *Para* rubber did not work the trees to death. These could be tapped repeatedly, providing income throughout an entire season. By contrast, *caucho* rubber occurred more sparsely, and would not survive repeated tapping. Mobile teams of workers would fell these trees in areas where property rights were not established, drain them of latex, and move on (Barham and Coomes, 1994b, p. 45-46). Nigerian *funtumia* is analogous to *caucho*. Circulars issued during the Second World War advised locals not to tap the trees more than three or four times per year, while other officials were even more cautious.⁴⁴ For the mobile non-Edo that exploited Benin's wild rubber, methods that killed the trees were those that economised on scarce labour.

⁴² See also Weinstein (1983, p. 45-48) for land tenure.

⁴³ NAI, CSO 26 09125 Assessment Report on Benin Division.

⁴⁴ NAUK, CO 852 515 7: Commodities Rubber Nigeria. For the circular, see West African Rubber Mission Report on Nigeria and British Cameroons, Appendix 2. For the more cautious official, see 19 May 1943: Comments on Recommendations made by RM, March 1943 by The Custodian of Enemy Property, R.B. Longe. He recommended *funtumia* not be tapped more than twice a year.

4. PRIVATE PLANTATIONS

Local *Funtumia* could be planted, and Brazilian *Para* had been introduced to Nigeria in 1895 (Anschel, 1965, p. 49). By 1921, however, plantations had not transformed Nigeria into the major producer it would become after 1945. In this section, I outline the difficulties faced by private plantations. European plantations were few, because of labour scarcity and government hostility to concessions. African private plantations are of limited visibility in the archival record, but also appear to have been small and faced similar challenges securing labour. These difficulties contrast with the rubber industry's relative ease in attracting labour in Southeast Asia, buttressed by favourable colonial policies over land and immigration. They also contrast with the more labour-abundant Benin that emerged as a successful exporter of rubber after the Second World War.

Overview

The most concerted effort by a European firm to plant rubber in Benin was that of Miller Brothers. The firm acquired roughly five hundred acres at Sapele in 1905, and another 560 in 1911.⁴⁵ This *Para* plantation was begun with 10,000 seeds imported from the East.⁴⁶ Cowan, the director, testified to the West African Lands Committee (WALC) in 1913 that the plantation was paying rent to 5 or 6 different local communities. At that time, 800 acres were under cultivation and the bulk of the 400 labourers did not come from Benin or Sapele, but rather from the more land-scarce Opobo, Kwa, and Ibibio territories (WALC, 1916, p. 468-475).

In 1915, a return of agricultural plantations in Benin province listed five – J.G.M Cranstoun and Company's at Sapoba, Messrs. MacIver's at Sapoba, I.T. Palmer's at Sapoba and Abraka, and the Nigerian Mahogany and Trading Company's at Unutu.⁴⁷ MacIver and Palmer (an African) were both said to have rubber in good condition at this time. Egboh (1985, p. 159) states that Cranstoun had two plantations in 1908, totalling 1,280 acres. MacIver reported in 1917 that they were doing no business in rubber, though their plantation caught the attention of Macmillan (1920, p. 73) and by 1927 their holdings had expanded to 2021 acres.⁴⁸ This and Cranstoun's were later taken over by the United Africa Company, becoming the Jamieson Estate Plantation (Pedler, 1974, p. 246). Miller's estate at Sapele later became UAC property as well (Fieldhouse, 1994, p. 204-5).

Others were less successful. A German firm, possibly Bey and Zimmer, planted ten acres that were surrendered during the First World War (Usuanlele, 2003, p. 59). The

⁴⁵ NAI, BP 311/1914: Rubber Plantation on the Ologbo Road, 18 March, 1911: Provincial Commissioner Warri to Provincial Commissioner Calabar.

⁴⁶ Southern Nigeria Annual Report for 1905, p. 24.

⁴⁷ NAI, BP 603 1915 Agricultural Plantations Benin Province. Two lists are given in this file; the first omits Cranstoun, the second MacIver.

⁴⁸ For 1917, see NAI, Ben Prof 2/4 BP 262 1917: Para Rubber, Benin Division, 16 Nov, 1917: Howe (for MacIver and Co) to Acting District Officer. For 1927, see NAI, CSO 26 09125 Assessment Report on Benin Division.

African Association start an experimental *Para* plantation in 1906 at Warri, but James believed that they “[did] not seem to have pushed the matter further.”⁴⁹ In 1908, they had an “excellent small *Para* rubber plantation at Eket.”⁵⁰ The British Cotton Growing Association started a plantation in Benin territory in 1909, but in 1917 it was “neglected,” containing only 228 trees.⁵¹

Less is knowable about private plantations owned by Africans.⁵² The Annual Reports and Igbafe (1979) take an upbeat view. In 1903, some “more intelligent chiefs” had started operations on their own account.⁵³ In 1906, the Provincial Forest Officer stated that the “feature of the year ... [had] been the number of small private plantations made by individual natives, although it [was] difficult to say exactly how many [had] been made.”⁵⁴ Igbafe (1979, p. 343-348) notes that 126 villages had been convinced to start plantations by the end of 1903, there were 369 private plantations by 1906, and that some 3,000 acres were owned by eleven private individuals or companies by 1925. The largest of these belonged to Palmer, reported to have 1500 acres at Abraka, employing 900 labourers who were paid the same wages as in the timber industry (WALC, 1916, p. 468-475).⁵⁵ The Obaseki had two *Para* plantations, of 10,000 and 12,000 trees, 4 to 6 years old in 1919.⁵⁶

Before 1921, however, most of these must have been small. Chief Ugo had a single acre at Benin (Egboh, 1985, p. 159). Thompson described those planted in the Benin City District in 1906 as “small private plantations.”⁵⁷ A 1917 return of *Para* plantations in Benin forwarded a list excluding those with less than 20 trees, and “small private plantations of which there is no record”. It listed 270 started in 1914 or 1915, with 57 seedlings planted on average.

Labour scarcity

These plantations had difficulty securing labour. Cowan told the WALC that his company did not use Edo labourers because, though they could make arrangements with headmen, the people were unwilling and would work for at maximum six months. He believed this was because the authority of the Benin chiefs had declined. Labour scarcity in Benin was also a result of low population density, exacerbated by competing demands from the state for road work and porters, and from timber concessions. African plantations faced similar difficulties. Cowan told the WALC that there were six African owned *Para* plantations of 10,000 to 30,000 trees in the Sapele district. They

⁴⁹ Southern Nigeria Annual Report for 1906, p. 38.

⁵⁰ Southern Nigeria Annual Report for 1908, p. 15.

⁵¹ NAI, BP 175/1917, *Para* Rubber Plantations, 19 June, 1917: D.O. Ubiaja to Resident.

⁵² Usuanlele (2003, p. 60) lists Lawani Bokoni, W.A. Sagay, S.D. Garrick, Bello Osagie (a Yoruba, an Itsekiri, a Kalabari, and a Benin trader) as having plantations of “various sizes” during this period, though he does not specify what they planted.

⁵³ Southern Nigeria Annual Report for 1903, p. 19.

⁵⁴ Report on the Forest Administration of Southern Nigeria for 1906, p. 17.

⁵⁵ Pedler (1974, p. 246) identified him as a Sierra Leonean who had previously been an agent for the RNC.

⁵⁶ NAI, Ben Prof 2/6 BP 480 19: Agricultural Department Report.

⁵⁷ Report on the Forest Administration of Southern Nigeria for 1906, p. 17.

had been paying for labour by allowing workers to plant “catch crops” among the trees, and as a result, the rubber had suffered. In his view, they had “tried to make the thing pay as they went along, and they have been pennywise and pound foolish” (WALC, 1916, p 468-475).

The difficulties faced by rubber planters in Benin echo those of other attempts to create rubber plantations in Africa during this period. Three companies acquired land to plant rubber in the Gold Coast in 1905-6, but could not compete with cocoa farms and gold mines for labour (Munro, 1981, p. 271). In East Africa, expatriate planters had expected cheap labour, but within months of starting “all were complaining loudly and bitterly about their labour difficulties” (Munro, 1983, p. 374).

This was, by contrast, a period during which estates and smallholders in Asia successfully expanded production. Clarence-Smith (2010), contrasting rubber’s success in Indonesia with its failure in the Congo, emphasizes that Sumatran smallholders, like successful Benin planters later on, recruited the labour of migrant sharecroppers. Large planters stated that they had left the Congo for Asia because of inadequate transport facilities and labour supply. Estates in Ceylon, Malaya and Sumatra were worked by immigrants from India and Java, while estates in Borneo and French Indo-China similarly relied on migrants (Bauer, 1948, p. 217). The government actively supported the immigration of Tamil and Chinese labourers; the former were used in tapping while the latter opened new land (Barlow, 1978, p. 43-45,51). Chinese labourers also became smallholders, developing two to four hectare blocks while working in mines or estates (Barlow, 1978, p. 39). The problems of labour supply that hindered Brazilian plantations will be discussed below.

Benin’s success later on can also be partly explained by relaxation of the labour constraint, due to population growth, land annexation, and immigration. Usuanlele (1988, p. 249-254) gives the most thorough explanation. Direct taxes introduced in 1916 created a need for cash income; the state had discovered a method for labour recruitment. Further, land annexations by chiefs, urban residents, and forest reserves encouraged individuals to plant trees on fallow plots to claim them permanently. These pressures combined with influx of Igbo willing to work as share tappers. Overall, the scarcity of labour relative to land was disappearing.

State capacity

In addition, the British were reticent to grant concessions to Europeans for working produce that Africans could exploit on their own (as opposed to timber). The African Association and Miller were both rejected for concessions in 1898 (Afigbo, 1970, p. 392). Officials such as Moor and Gallwey opposed these, preferring “development by the natives themselves.”⁵⁸ Evans’ application to rent communal plantations was turned down in 1911 (Egboh, 1985, p. 158). By Pedler’s (1974, p. 245-6) account, Miller only

⁵⁸ NAUK, FO 2/179: 28 July, 1898: Gallwey to Under-Secretary of State. See also his letter from 13 May, 1898 in the same volume.

acquired land after Cowan spoke with Egerton, who had recently come from Malaya and was disappointed that merchants in Nigeria seemed to be showing no comparable initiative in developing rubber. Where other individuals or firms acquired labour, these were exceptions that had “resulted from land transactions carried out by African chiefs before the policy of the protectorate government had been well established.” Phillips (1989) argues that the British came to favour “peasants” over “plantations” in West Africa for a long list of reasons bound together by the stability of indirect rule. British hegemony depended on the power of local chiefs, and their control over access to “communal” land was seen as integral to their authority (see also Berry, 1992). This was a policy borne of weakness.

These difficulties were not unique to Benin. European firms throughout West Africa remained horizontally, rather than vertically integrated. Barred from directly engaging in agriculture and faced with a market in which export crops were produced by thousands of small, dispersed farmers, large trading firms chose to operate in many products and colonies, but to refrain from production (Hopkins, 1976). Prospective rubber planters elsewhere in West Africa found the colonial office unwilling to grant them monopolies even to collect wild rubber (Munro, 1981). Firestone’s success in Liberia came later. He gained concessions from the Liberian government in both land and tariffs that firms in British West Africa could not (Finlay, 2009, p. 77).

These factors also gave Asia an edge. Land was more readily available to expatriates. The government in Malaya granted land to Chinese tapioca and gambier planters on the condition they also plant rubber (Jackson, 1968, p. 228). Malay residents sold their ancestral lands to estate groups and other outside interests (Barlow, 1978, p. 39). Barlow (1978, p. 27) lists political stability as an additional factor in Malaya’s favour.

5. COMMUNAL PLANTATIONS

The colonial government established thousands of small plantations of mostly *Funtumia* rubber throughout Benin, owned by local communities. “Communal” is the government’s term. At first seen as promising, it was clear before the First World War that these were in trouble. They suffered from labour scarcity and a colonial state that lacked staff and resources, was unable to transfer skills and information, and could not forecast future prices. Many of the same constraints restrained the development of rubber plantations in Brazil during the same period. These difficulties, as shown above, contrast with the conditions that allowed Asian producers and later Edo smallholders to succeed.

Initial promise

The communal plantations were started early on. In 1899, nurseries were established in a few district centres, so that plantations could be made close to the villages. These would be used for seed to sow in the bush at the beginning of the rainy

season.⁵⁹ Of 450 miles of road existing in the Benin territories, the Forestry Inspector planted 250 with rubber seed.⁶⁰ In 1900, twenty large nurseries were established in the Benin territories to supply seedlings.⁶¹ All villages receiving timber royalties were required to establish nurseries from 1901 (Igbafe, 1979).

Undergirding these efforts was paternalistic racism, made clear by Bedwell, the Acting Colonial Secretary, in 1903:

It is not in the nature of the average West African to lay out capital for which there is no immediate return. He can understand the yam growing at his door; he can understand the cask of oil to be filled before his "boys" can return with the required cloth, pipe or frock-coat, but he will not sew for his son to reap; nor will a village work, of its own initiative, for the benefit of the next generation that is to occupy it. It is this difficulty that has rendered so great the task of encouraging the rubber industry.⁶²

The government distributed seeds and seedlings and oversaw tapping. The communal plantations were mostly *Funtumia*.⁶³ By the end of 1903, 145,000 plants had been established in 126 village plantations (Igbafe, 1979, p.343). There were 1,050 communal plantations in the Province in 1906, 1629 in 1907, and 2251 in 1908 (Egboh, 1985, p. 159). Similar efforts were made elsewhere in Southern Nigeria, though Benin was the model case.⁶⁴

These were initially seen as promising, and were encouraged by colonial officials. In 1904, Egerton saw the boom in the rubber market and the development of trade as "gratifying," and hoped improved methods would help prices eventually close on those paid for rubber from the Straits and Ceylon.⁶⁵ Experiments were in progress to improve tapping.⁶⁶ In 1905, Fosbery reported that rubber continued to show a "considerable increase," predicting that "with systematic cultivation and collection it will become a valuable addition to the exports of the country."⁶⁷ In 1906, two pupils had just returned from the French School of Forestry in Mali.⁶⁸ In 1908, there were 2,251 *Funtumia* plantations in the Central Province, containing 1,125,972 trees.⁶⁹

⁵⁹ Southern Nigeria Annual Report for 1899-1900, p. 10.

⁶⁰ Southern Nigeria Annual Report for 1899-1900, p. 10.

⁶¹ Southern Nigeria Annual Report for 1900, p. 14.

⁶² Southern Nigeria Annual Report for 1903, p. 19.

⁶³ Secondary sources offer contradictory evidence. Igbafe (1979, p. 347) refers to *Funtumia*, while Usuanlele (2003, p. 58) states that the first plantations were *Para*, with *Funtumia* and *Ceara* "introduced" only in 1908. In the annual reports it is clear that *Funtumia* was the predominant variety: see the Report on the Forest Administration of Southern Nigeria for 1906, p. 17, or the Southern Nigeria Annual Reports for 1907 (p. 11), 1908 (p. 15) or 1909 (p. 12).

⁶⁴ These are discussed in the Southern Nigeria Annual Reports for 1904 through 1911.

⁶⁵ Southern Nigeria Annual Report for 1904, p. 19.

⁶⁶ Southern Nigeria Annual Report for 1904, p. 24.

⁶⁷ Southern Nigeria Annual Report for 1905, p. 21.

⁶⁸ Report on the Forest Administration of Southern Nigeria for 1906, p. 38.

⁶⁹ Southern Nigeria Annual Report for 1908, p. 15.

In 1910, several thousand communal *Funtumia* plantations had become large enough to tap.⁷⁰ Tapping and rubber preparation were done under the supervision of the Forest Department, and in the presence of the owners. To coagulate the latex, the rubber was boiled, and then rolled into thin biscuits using a wooden roller on a table. The rubber was washed with hot water. These biscuits were then hung for drying and smoked in a long drying shed. The amber-coloured biscuits were reported to be of “the first quality,” produced “by means of simple appliances that can easily be procured by the natives,” and were sold for 6s 6d per lb despite a falling market.⁷¹ This was seen as a “very great improvement on the usual quality of rubber exported from Southern Nigeria.” Outside observers were impressed with these plantations; Christy (1911) reported that “[t]he system of native communal plantations so successful in Southern Nigeria is admirable, and should be adopted by all the west African colonies.”

Labour scarcity

Several problems were, however, already apparent before prices began to fall. Labour scarcity was apparent as early as 1901. That year, the Annual Report for Southern Nigeria noted that recent “changes in the social conditions of the natives of these territories, particularly with regard to slavery, render it certain that the capacity of these native carriers for their transport work is not likely to increase, at all events for some years to come, until a good native labour market is established.”⁷² In 1906, similarly, the Provincial Forest Officer reported that the Isoko and Urhobo were too involved in road-making to devote much time to plantations; where rubber had been taken up, palm oil had been abandoned.⁷³

The 1913 Report on the Communal Rubber Plantations detailed five major problems that were causing them to fail: first, the weakened authority of the local chiefs; second, competing labour demand from other sectors, such as timber areas, government works, road construction, and portorage; third, insufficient incentives for the local communities, even when the government waived its one third claim to the plantations’ revenue in that year; fourth, villagers’ lack of experience with the product, which was made worse by deferred payoff of rubber as a tree crop, and; fifth, sharp labour demands that conflicted with seasonal festivals and funerals.⁷⁴ Tapping had to be done during the rainy season, when villagers preferred to do farm work and rebuild their

⁷⁰ Southern Nigeria Annual Report for 1910, p. 14.

⁷¹ Southern Nigeria Annual Report for 1910, p. 14.

⁷² Southern Nigeria Annual Report for 1901, p. 8.

⁷³ Report on the Forest Administration of Southern Nigeria for 1906, p. 17.

⁷⁴ NAI, Ben Prof 2/1 BP 364 1914: Report on the Communal Rubber Plantations for 1914 (1913). Compounding this was the uncompromising scheduling of the Forestry Department. The report’s author wrote that villagers objected “to the pressure at which we have to make them work in order to get through the large number of scattered plantations in the season and usually would like use to wait some convenient time between their festivals and funerals for our visit.”

homes.⁷⁵ Results on the model plantations, similarly, could only be achieved by “constantly worrying” the Obaseki and Edosomah for labour.⁷⁶

The next year, the report on the communal plantations noted that it was difficult getting upkeep work done:

The village people have shown very plainly that they do not care for the plantations. The Forest guards report that they have the greatest difficulty in getting any cleaning or clearing done. At Uburu Uku the forest Guards had been driven away when they attempted to get the plantations cleaned. ... At Ogwashi Uku and Abah very few men would be persuaded to do the work which was done almost entirely by the Forest Guards.⁷⁷

Similarly, in Ishan, the people were disinclined to do the work requested, and officials felt they had been wasting their time. Especially in Asaba, Ifon and Ishan, officials had difficulty getting men to work. Many chiefs complained that, “as their power had been broken, it was hardly fair to make them responsible for the boys not working.”⁷⁸ In addition to the work of tapping and upkeep, processing was labour intensive. Latex had to be cooked at central cooking camps and let stand for eighteen hours or more before it was ready to cook. For people from outlying villages, this was not worth the time involved, and they would not stay behind to learn how to properly cook the rubber.⁷⁹ Officials recognized that their own labour requisitioning contributed to this scarcity of labour – the same report noted that the question of carriers “has been a difficult one. The Assistant Conservator of Forests is obliged to find his own carriers, except on leaving a station, to take him from village to village. These carriers are not paid and this does not help to make the rubber business any more popular.” In 1916, the Resident pointed out that it was not worthwhile for villages to send small quantities of rubber to Benin, and that they did not do so voluntarily.⁸⁰

The quality of Nigerian rubber, among the worst in the world after the Second World War (Anschel, 1965), was an issue for wild and plantation rubber. In 1906, it was reported that “up to the present practically the whole of the rubber exported is forest produce, rudely prepared by the native with little or no intelligent control of the collection.”⁸¹ At that time, most *Funtumia* was shipped as either “Lagos lump” or “Benin lump,” containing a very large percentage of water and impurities” and adulterated with latex from other plants.⁸² While I have found no direct evidence from Benin, the

⁷⁵ NAI, BP 5 1915: Report on the Tapping Operations on the Communal Rubber Plantations for 1914.

⁷⁶ NAI, Ben Prof 2/1 BP 364 1914: Report on the Communal Rubber Plantations for 1914 (1913). Similarly, the state withheld royalties from Chiefs Eso, Oshodi and Obaseki in 1915 for failing to weed their plantations (Usuanlele, 1988, p. 222).

⁷⁷ NAI, BP 5 1915: Report on the Tapping Operations on the Communal Rubber Plantations for 1914.

⁷⁸ NAI, BP 5 1915: Report on the Tapping Operations on the Communal Rubber Plantations for 1914.

⁷⁹ NAI, BP 5 1915: Report on the Tapping Operations on the Communal Rubber Plantations for 1914.

⁸⁰ NAI, Ben Prof 2/3 BP 523 1916: Proceeds from Rubber Sales; no date given, letter to Secretary, Southern Provinces.

⁸¹ Southern Nigeria Annual Report for 1906, p. 31.

⁸² Report on the Forest Administration of Southern Nigeria for 1906, p. 35.

experience of the Lagos hinterland suggests that low-quality production was a labour-saving technique.

In 1909, one official complained that, while all licensees and Ogas were instructed in the “proper method” of making rubber, the Yorubas “simply refuse to do it, as they can sell bad rubber near Illushi even if not at Siluko or Benin City.”⁸³ Two African Rangers were sent to French West Africa, and returned in 1907 on a lecture tour that did encourage some quality biscuit production in Benin, but only 35.5 lbs were actually offered for sale (Egboh, 1985, p. 166-7). Biscuits took twice as long to produce and lost weight more rapidly than lump rubber; one official estimated that it would require 4s per lb to induce producers to switch (*ibid.*). The Adulteration of Produce Ordinance of 1897 was used between 1907 to 1909 to prevent producers from producing lump rubber, but this was quickly withdrawn due to protests from European firms who faced declining supplies. The quality of Nigerian rubber did not improve – one 1918 textbook described “Benin ball” as “generally dirty,” having “rotten, woody smell” (Pearson, 1918).

The role of labour abundance in explaining the relative success of Asia has already been discussed above. Labour scarcity in Benin as a hindrance to rubber plantations mirrors the situation of Brazil. Coomes and Barham (1994, p. 253-256) suggest that the failure to develop plantations in Brazil stemmed from scarce labour, a high opportunity cost of capital (discussed below), and the long time to maturation for planted rubber. This list is echoed by Dean (1987, p. 39) and Weinstein (1983, p. 31-32), while Frank and Musacchio (2006, p. 275) similarly conclude that, “because Brazil was committed to a high-wage, labour-scarce production regime, it was in Southeast Asia that plantations developed.”⁸⁴ Wages for plantation labourers in Brazil would have to have been competitive with the urban sector or with independent tapping, and high enough to discourage illicit sales. Daily wages in Asia were roughly one eighth those in Amazonia, and Asian labour had fewer outside options (Coomes and Barham, 1994, p. 253-256). In Asia, plantation labour was less mobile, there was no competing extractive sector, and cultivation areas were closer to the sources of imported food for the plantation workers (Barham and Coomes, 1994a, p. 100). Dean (1987, p. 65, p.81) acknowledges that labour scarcity was also encountered by planters in British Guiana, Surinam, and on Ford’s failed Brazilian plantation.⁸⁵

⁸³ NAUK, CO 520/83, Enc. 25 Sept, 1909: Unwin to Thompson.

⁸⁴ This is not a new view. Melby (1942) identifies labour scarcity as the principal obstacle to the development of Brazilian rubber.

⁸⁵ Dean’s main argument is that South American Leaf Blight, which was endemic in Brazil but not in Asia, was the main factor that hindered plantation development in Brazil. There is no similar record of blight in the history of Nigerian rubber, so it cannot be treated as a barrier to success during this period. The absence of endemic diseases specifically evolved to attack *Para* may have been one of the factors in its success in Benin after 1945.

State capacity

Shortage of labour was not the only difficulty faced by the plantations. The colonial government was reliant on local chiefs to implement its programs, and these agents succeeded in appropriating the returns from the communal plantations. The state was short of the skilled staff and capital needed by the plantations, and so found it difficult to transmit expertise to locals. Finally, the government had underestimated the effect of Asian production on world rubber markets. Similar difficulties held back the development of rubber plantations, both in Brazil and in East Africa.

While the proceeds of the plantations were supposedly to be split between the government and the local communities, their benefits went largely to the chiefs. This was true also of the model *Para* plantation on the road between Benin City and Sapele, which was owned by eighteen Benin City chiefs who had “provided the labour for it free.”⁸⁶ Lugard, similarly, believed that “communal” labour meant “forced” labour, and opposed the plantations on these grounds (Egboh, 1985, p. 160). In 1924, the Resident chastised the Oba, requesting the District Officer to inform him that if his workers were “called upon to work for nothing, it simply means that they will leave their villages, and either seek employment with the timber concessionaires or elsewhere outside the division.”⁸⁷ Bradbury (1973) notes that chiefs received one third of the wages paid for labourers they requisitioned, and a share of the profits from rubber. Some were still profiting from these plantations as late as the 1950s, though this hurt their legitimacy.

A plantation established by the Forestry Department near Usonigbe had been turned over to the local villages around 1910, but in 1914 was appropriated by the Oba. His successor was leasing it to Palmer for tapping in 1937.⁸⁸ A *Para* plantation on Sapele Road that had been damaged by fire was turned over to the Iyashere in 1916, since he was the only chief who had shown interest in it.⁸⁹ One official remarked that “looking at it from a business profit and loss point of view the communal plantations have so far been a failure, except to the chiefs.”⁹⁰

In addition, the colonial state was short of human and physical capital – the trained staff and equipment needed by the communal plantations. The supply of seed was not always reliable; seeds imported from Cameroon failed to germinate, while poor germination had lowered the number of *Funtumia* planted in Southern Nigeria from 234,878 in 1907 to 133,094 in 1908. Of the 622 plantations formed during that year, most were extensions to existing ones.⁹¹ Before 1911, thinning had been neglected, and the trees needed each other’s support to stand.⁹² At Agbor and Asaba, while thinning

⁸⁶ NAI, Ben Prof 2/1 BP 364 1914: Report on the Communal Rubber Plantations for 1914 (1913).

⁸⁷ NAI, Ben Prof 2/4 BP 262 1917: Para Rubber, Benin Division. 18 Feb, 1924: Resident to District Officer.

⁸⁸ NAI, Ben Dist 1 BD 84 Vol 2: Usonigbe Native Court and District Affairs: 16 March, 1937: Palmer to DO; handwritten note by Jull.

⁸⁹ NAI, Ben Prof 2/5 BP 173/1916 Communal Rubber Plantation Management of. 9Nov, 1916: Conservator of Forests Benin Circle to Resident Benin Province.

⁹⁰ NAI, BP 5 1915: Report on the Tapping Operations on the Communal Rubber Plantations for 1914.

⁹¹ Southern Nigeria Annual Report for 1908, p. 15.

⁹² NAI, Ben Prof 2/1 BP 364 1914: Report on the Communal Rubber Plantations for 1914 (1913).

was desperately needed, there was no staff to do the work. The report for 1913 admitted neglect by the government, stating that “it is a breach of good faith and fair dealing to have started these rubber plantations as a native industry and leave them, now when maturing and needing thinning, tapping etc under European supervision.”⁹³

Similarly, Miller had obtained permission in 1916 to tap 400 *Para* trees on the Sapoba road, at a cost of 1s per tree for a season, but reported to the government that it had been unable to tap these because it was difficult to find a European supervisor, children and livestock interfered, and there were too few trees to justify smoke and drying sheds.⁹⁴

The District Officer worried that the villages were “disappointed with the results of their labour.”⁹⁵ In Ishan in 1913, the Forestry Department was unable to tap the 93 communal plantations.⁹⁶ At times, one Forest Guard and one pupil had to supervise twenty men.⁹⁷ That year, the senior Conservator of Forests suspended tapping “on the ground that the trees need rest, and the Forestry Department is short of officers.”⁹⁸ In 1917, there were no funds to supervise preparation and assist in the sale of rubber at Ubiaja.⁹⁹

In 1917, the government had to borrow pans, metal spoons, tapping knives, rollers, cog wheels, fittings, and bottles of acetic acid from Miller Brothers.¹⁰⁰ Local tapping knives were “slow and bad,” though by 1914 a local “native imitation” of *Para* knives had been devised.¹⁰¹ Smoking facilities were inadequate, and could not prevent the cured rubber from becoming mouldy.¹⁰² The two smoking sheds at Benin City were poorly built, lacked proper heating and drying facilities, and were in constant danger of catching fire.¹⁰³

It was, then, difficult for the colonial government to transmit new skills related to plantation management, tapping methods, and output quality. Much plant distribution had to be done from the Onitsha Gardens. As early as 1906, it was recognized that this was a poor location relative to the Central Province. It was too dry and too far from the centres in which cocoa and *Para* rubber could be successfully cultivated.¹⁰⁴ *Para* yields were estimated to be five times greater than those for *Funtumia* per acre, but there were only 6,000 acres in Southern Nigeria by 1922 (Egboh, 1985, p. 162). One officer reported in 1913 that the “native idea of a clean plantation is often opposed to all Forest

⁹³ NAI, Ben Prof 2/1 BP 364 1914: Report on the Communal Rubber Plantations for 1914 (1913).

⁹⁴ NAI, BP 510 1916 *Para* Trees Benin City Arrangement with Regard to Tapping, 12 Oct 1916: Herald to DO Benin City

⁹⁵ NAI, BP 138 1914: Annual Reports Benin Province.

⁹⁶ NAI, BP 138 1914: Annual Reports Benin Province.

⁹⁷ NAI, BP 5 1915: Report on the Tapping Operations on the Communal Rubber Plantations for 1914.

⁹⁸ NAI, BP 5 1915: Report on the Tapping Operations on the Communal Rubber Plantations for 1914.

⁹⁹ AI, Ben Prof 2/4: BP 403 17: Village Rubber Plantation, 3 July, 1917: District Officer Ubiaja to Resident, Benin and 9 Aug, 1917: Resident to District Officer Ubiaja.

¹⁰⁰ NAI, Ben Prof 2/4 BP 262 1917: *Para* Rubber, Benin Division.

¹⁰¹ NAI, Ben Prof 2/1 BP 364 1914: Report on the Communal Rubber Plantations for 1914 (1913).

¹⁰² NAI, Ben Prof 2/4 BP 270 1917: Sale of Village Rubber Plantation, 28 March, 1917: District Officer to Resident.

¹⁰³ NAI, Ben Prof 2/1 BP 364 1914: Report on the Communal Rubber Plantations for 1914 (1913).

¹⁰⁴ Southern Nigeria Annual Report for 1906, p. 41.

ideas of soil protection and the arrival of a Forest Officer often leads to the plantation being swept and scraped bare of all needful and protecting surface soil and humus.”¹⁰⁵ Individual rubber samples mentioned in colonial correspondence were often poor – in 1918 samples of locally grown rubber were reported to be “anything but good, and it is evident if the best results are to be obtained, that the Beni ‘Planter’ requires both advice and supervision.”¹⁰⁶

This too was a problem for Brazil. Capital there had a high opportunity cost, and was more profitably invested in establishing new rubber trails, setting up tappers, supplying them, shipping, and other aspects of the wild rubber trade than in new planting (Coomes and Barham, 1994, p. 253-256). Similarly, much of the capital that had been initially invested in wild rubber production in Brazil was unsuitable for plantation development; steamboats and the accounts receivable from tappers could not be easily converted into plantation equipment (Dean, 1987. p. 50).

Finally, the return to rubber fell sharply once Asian production began to increase. While initially proposed as a year-to-year arrangement, the waiving of the government’s share of the revenues from the communal plantations soon became permanent.¹⁰⁷ Officials realized that the failure to anticipate the collapse of the world market was a major oversight on their part; the 1914 report on the communal plantations noted that:

The possibility, in fact probability of a fall in the price of rubber was evidently not taken into consideration when these operations were started...A second and very important point is that the natives have not taken up the plantations with much enthusiasm. Every year the returns have been smaller and, most important of all, the natives have been kept waiting many months before receiving payment.¹⁰⁸

This echoed the failure of British planters in East Africa to forecast the magnitude of the impact that Asian production would have on world prices (Munro, 1983, p. 373). In Brazil, forecasts were similarly misguided. The peak years of price uncertainty coincided with the boom in worldwide automobile production. Producers believed that demand would increase at a rising pace, only to be find that technological change in rubber tyres dampened this growth (Frank and Musacchio, 2006, p. 280-288).

The government admitted failure. The same report recommended turning the plantations over to the local villages, noting that it would not be remunerative to work them with paid labour. In 1916, the Forestry Department ceased to exercise any control over the communal plantations, and the commissioner of the Benin Province requested the District Officer to inform the “native owners” that, since the government “has given them practical instruction in the method of planting, tapping, and preparing the rubber

¹⁰⁵ NAI, Ben Prof 2/1 BP 364 1914: Report on the Communal Rubber Plantations for 1914 (1913).

¹⁰⁶ NAI, Ben Prof 2/4 BP 262 1917: Para Rubber, Benin Division. 12 Dec, 1917: Herald toWatt.

¹⁰⁷ NAI, BP 76 1914: Communal Plantations Central Province; 16 Dec, 1913: Colonial Secretary to Conservator of Forests.

¹⁰⁸ NAI, BP 5 1915: Report on the Tapping Operations on the Communal Rubber Plantations for 1914.

in those plantations, it is now their duty to carry on the work themselves without regular supervision and assistance.”¹⁰⁹ Proceeds were then divided between the Native Authority and the villages.¹¹⁰ In 1918, the District Officer for Benin asked the Resident about his meeting with the local agent for Miller Brothers, concerning the continued purchase of rubber. “If there is no market for the Native Administration Rubber,” he warned “tapping should cease temporarily and the trees be allowed to rest.”¹¹¹ The export market had collapsed. It was then “impossible to import rubber into the United Kingdom.” Miller Brothers were unable to ship rubber from Sapele to Great Britain. He sighed:

It appears that rubber will not keep in this country, and unless a market can be found for the rubber products of the communal rubber plantations and the para plantations, it would appear to be a waste of both time and money to continue tapping and preparing rubber, as is now being done by the Native Administration (*ibid*).

In 1921, the Director of Agriculture wrote his above-quoted memorandum abandoning rubber.

6. CONCLUSION

I have argued that labour scarcity and the weakness of the colonial state explain the difficulties faced by rubber in Benin before 1921. I have argued that, in wild rubber, labour scarcity increased monitoring costs and influenced tapping methods. It raised planters costs in the private plantation sector, and made proper tapping and maintenance of the communal plantations difficult. The colonial state lacked the capacity to monitor the exploitation of wild rubber, and the resources to properly regulate access to Benin’s stock of wild rubber. Dependent on local chiefs, headmen and forest guards, short on staff and capital, and lacking foresight, the state’s efforts to promote plantation rubber were ineffective. The development of plantation rubber in Benin would not emerge until these constraints were removed.

What are the lessons for African development? First, I have re-enforced the importance of several unfashionable determinants of technological change. Relative factor endowments, in particular the scarcity of labour and capital, held back the adoption of plantation rubber. Opportunity costs, especially the relative profitability of work in other sectors, had the same effect. A lack of state capacity at both the local and national levels prevented the government from effectively establishing property rights, enforcing regulations, or maintaining its investments. In addition, I have emphasized that geography is not destiny. In contrast to other examples of rapid diffusion of New

¹⁰⁹ NAI, Ben Prof 2/5 BP 173/1916 Communal Rubber Plantation Management of, 2 March, 1916: Commissioner Benin Province to District Officer.

¹¹⁰ See, e.g. NAI, Ben Prof 2/3 BP 523 1916: Proceeds from Rubber Sales.

¹¹¹ NAI, Ben Prof 2/4 BP 262 1917: Para Rubber, Benin Division; 4 July, 1918: DO to Resident.

World crops into areas where they could be grown, the transmission of rubber to Benin was delayed. Finally, no condition is permanent. Rubber in Benin boomed during the Second World War, only to decline during the country's oil boom.

REFERENCES

- Acemoglu, D. and Johnson, S. and Robinson, J.A. (2002) Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution *The Quarterly journal of economics* 117(4):1231-1294
- Afigbo, A. E. (1970). Sir Ralph Moor and the economic development of Southern Nigeria, 1896-1903. *Journal of the Historical Society of Nigeria*, 5(3):396–421.
- Allen, R.C. (2009) *The British industrial revolution in global perspective* Cambridge University Press
- Amanor, K. S. (1994). *The New Frontier: Farmers' Response to Land Degradation A West African Study*. Zed Books, London.
- Anschel, K. R. (1965). *Economic aspects of peasant rubber production in Midwestern Nigeria*. Ph.D. Thesis, Michigan State University. Dept. of Agricultural Economics.
- Arhin, Kwame (1980). The economic and social significance of rubber production and exchange on the Gold and Ivory coasts, 1880-1900, *Cahiers d'Études africaines*, 77-78: 20-1-2, 49-62.
- Arrighi, G. (1970). Labour supplies in historical perspective: a study of the proletarianization of the African peasantry in Rhodesia. *Journal of Development Studies*, 6(3):197–234.
- Austin, G. (2005). *Labour, land, and capital in Ghana: from slavery to free labour in Asante, 1807-1956*. University of Rochester Press, Rochester, NY.
- Austin, G. (2008) Resources, techniques, and strategies south of the Sahara: revising the factor endowments perspective on African economic development, 1500-2000, *Economic History Review* 61(3), 587-624
- Bandiera, O. and Rasul, I. (2006). Social networks and technology adoption in northern Mozambique. *The Economic Journal*, 116(514):869–902.
- Barham, B and Coomes, O.T. (1994a). Reinterpreting the Amazon Rubber Boom: Investment, the State, and Dutch Disease *Latin American Research Review*, 29(2): 73-109
- Barham, B and Coomes, O.T. (1994b). Wild Rubber: Industrial Organisation and the Microeconomics of Extraction During the Amazon Rubber Boom (1860—1920) *Journal of Latin American Studies* (26): 37-72
- Barlow, C. (1978) *The natural rubber industry, its development, technology, and economy in Malaysia*, Oxford University Press, Oxford.
- Bates, R.H. (1981) *Markets and states in tropical Africa: the political basis of agricultural policies* University of California Press
- Bauer, P.T. (1948) The rubber industry: a study in competition and monopoly, *Harvard University Press, Cambridge*.

- Bell, H. (1907) African Tree Rubber. (*Funtumia elastica*, Stapf.) *Bulletin of Miscellaneous Information (Royal Gardens, Kew)* 5:187-190
- Berry, S. (1975). *Cocoa, custom, and socio-economic change in rural Western Nigeria*. Clarendon Press, Oxford.
- Berry, S. (1992) Hegemony on a shoestring: Indirect rule and access to agricultural land. *Africa: Journal of the International African Institute* 62(3): 327-355.
- Besley, T. (1995). Property rights and investment incentives: Theory and evidence from Ghana. *Journal of Political Economy*, 103(5):903-37.
- Beusekom, M. M. V. (2002). *Negotiating development: African farmers and colonial experts at the Office du Niger, 1920-1960*. James Currey Ltd.
- Blanckenburg, P. (1963). *Rubber farming in Benin area, a study of some socio-economic factors influencing rubber production*. Nigerian Institute of Social and Economic Research. Ibadan.
- Bradbury, R. E. (1957). *The Benin kingdom and the Edo-speaking peoples of southwestern Nigeria*. International African Institute.
- Bradbury, R. E. (1973). *Benin studies*. Oxford University Press.
- Brett, E. (1973). *Colonialism and underdevelopment in East Africa: the politics of economic change, 1919-1939*. NOK Publishers.
- Bromund, T. (1997). Field of dreams: An environmental approach to the origins and failures of the East African groundnuts scheme, 1946-1948. *Working Paper*.
- Brown, C. A. (2003). *"We were all slaves": African miners, culture, and resistance at the Enugu government colliery*. Greenwood Press.
- Christy, C. (1911). *The African rubber industry and Funtumia elastica ("kickxia")*. J. Bale, Sons & Danielson, Limited, London.
- Clarence-Smith, W.G. (2010) Rubber cultivation in Indonesia and the Congo from the 1910s to the 1950s: divergent paths. *Paper presented at the conference "Colonial Extraction in the Netherlands Indies and Belgian Congo: institutions, institutional change and long term consequences" Utrecht University*.
- Cogneau, D. (1992) *Comparaisons de compétitivité en Afrique et en Asie - Analyse macroéconomique de filières agricoles*, Paris: DIAL, 62 pp.
- Coomes, O.T. and Barham B. (1994). The Amazon Rubber Boom: Labor Control, Resistance, and Failed Plantation Development Revisited *The Hispanic American Historical Review*, 74(2): 231-257
- Conley, T. G. and Udry, C. (2010). Learning about a new technology: Pineapple in Ghana. *American Economic Review*. 100(1):35-69.
- Dean, W. (1987) *Brazil and the struggle for rubber: a study in environmental history*. Cambridge University Press
- Dufo, E., M. Kremer, and J. Robinson (forthcoming) How High are Rates of Return to Fertilizer? Evidence from Field Experiments in Kenya *American Economic Review*, 98(2): 482-88
- Dumett, R. (1971). The rubber trade of the Gold Coast and Asante in the nineteenth century: African innovation and market responsiveness. *Journal of African History*, 12(1): 79-101.

- Egboh, E. O. (1985). *Forestry policy in Nigeria, 1897-1960*. University of Nigeria Press.
- Egharevba, J. U. (1949). *Benin law and custom*. Niger Press.
- Fairhead, J. and Leach, M. (1996). *Misreading the African Landscape: Society and Ecology in a Forest-Savanna Mosaic*. Cambridge University Press.
- Fenske, J. (2011a) Does land abundance explain African institutions? *Working paper*.
- Fenske, J. (2011b) Land abundance and economic institutions: Egba land and slavery, 1830-1914. *Forthcoming in the Economic History Review*.
- Ferguson, J. (1990). *The anti-politics machine: "Development," depoliticization, and bureaucratic power in Lesotho*. Cambridge University Press.
- Fieldhouse, D.K. (1994) *Merchant capital and economic decolonization: the United Africa Company, 1929-1987*. Clarendon Press. Oxford.
- Forde, C. D., R. C. Scott and M. Perham (1946) *The Native Economies of Nigeria*. Faber and Faber.
- Foster, A. D. and Rosenzweig, M. R. (2001). Learning by doing and learning from others: Human capital and technical change in agriculture. *The Journal of Political Economy*. 103(6): 1176-1209.
- Frank, Z. and Musacchio, A. (2006) Brazil in the International Rubber trade, 1870-1930 in Steven Topik, Carlos Marichal, and Zephyr L. Frank (eds.) *From silver to cocaine: Latin American commodity chains and the building of the world economy, 1500-2000*, Duke University Press, pp. 271-299
- Frankema, E. and van Waijenburg, M. (2010) "Real wages in British Africa, 1880-1940". *Paper presented at the LSE African Economic History workshop*.
- Galor, O. and Weil, D.N. (2000) "Population, technology, and growth: From Malthusian stagnation to the demographic transition and beyond" *American economic review* 90(4): 806-828
- Harms, R. (1975). The end of red rubber: A reassessment. *The Journal of African History*, 16(1):73-88.
- Hochschild, A. (1998). *King Leopold's ghost*. Pan McMillan. London.
- Hopkins, A.G. (1973) *An economic history of West Africa*. Longman's London.
- Hopkins, A. G. (1976). Imperial business in Africa part II. interpretations. *The Journal of African History*, 17(02):267-290.
- Igbafe, P. A. (1970). The fall of Benin: A reassessment. *The Journal of African History*, 11(3):385-400.
- Igbafe, P. A. (1975). Slavery and emancipation in Benin, 1897-1945. *The Journal of African History*, 16(3):409-429.
- Igbafe, P. A. (1979). *Benin under British administration: the impact of colonial rule on an African kingdom, 1897-1938*. Humanities Press, Atlantic Highlands, NJ.
- Isaacman, A. F. (1996). *Cotton is the mother of poverty : peasants, work, and rural struggle in colonial Mozambique, 1938-1961*. Heinemann, Portsmouth, N.H.
- Jackson, J.C. (1968) *Planters speculators: Chinese and European agricultural enterprise in Malaya, 1786-1921*. University of Malaya Press, Kuala Lumpur.
- Jones ,W. O. (1959). *Manioc in Africa*. Stanford University Press.
- Ling Roth, H. (1903) *Great Benin: its customs, art and horrors*. F. King, Halifax, England.

- Maack, P. (1996). *"We don't Want Terraces." Protest and Identity under the Uluguru Land Usage Scheme*. Custodians of the land: ecology & culture in the history of Tanzania. James Curry.
- Mackenzie, F. (1998). *Land, Ecology and Resistance in Kenya, 1880-1952*. Edinburgh University Press, Edinburgh.
- McCann, J. (2005). *Maize and grace: Africa's encounter with a New World crop, 1500-2000*. Harvard University Press.
- Macmillan, A. (1920) *The Red Book of West Africa*. Frank Cass. London.
- Melby, John (1942) Rubber River: An Account of the Rise and Collapse of the Amazon Boom *The Hispanic American Historical Review* 22(3): 452-469
- Munro, J. F. (1981). Monopolists and speculators: British investment in West African rubber, 1905-1914. *The Journal of African History*, 22(2):263-278.
- Munro, J. F. (1983). British rubber companies in East Africa before the First World War. *The Journal of African History*, 24(3):369-379.
- Ofonagoro, W. I. (1979). *Trade and imperialism in Southern Nigeria 1881-1929*. NOK Publishers International.
- Okpeke, L. (1992). *Tropical Tree Crops*. Spectrum Books Limited, Onitsha.
- Omosini, O. (1979). The rubber export trade in Ibadan, 1893-1904: Colonial innovation or rubber economy. *Journal of the Historical Society of Nigeria*, 10:21-46.
- Osborn, E. L. (2004). 'Rubber fever', commerce and French colonial rule in upper Guinée, 1890-1913. *Journal of African history*, 45(3):445-465.
- Ostrom, E. (1991). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.
- Pearson, H. C. (1918). *Crude rubber and compounding ingredients: a textbook of rubber manufacture*. The India rubber publishing company.
- Pedler, F. J. (1974) *The lion and the unicorn in Africa: A history of the origins of the United Africa Company 1787-1931*. Heinemann Educational. London.
- Phillips, A. (1989). *The Enigma of Colonialism: British Policy in West Africa*. Indiana University Press.
- Rae, G. (1938). The statistics of the rubber industry. *Journal of the Royal Statistical Society*, 101(2):317-375.
- Resor, R. R. (1977). Rubber in Brazil: Dominance and collapse, 1876-1945. *The Business History Review*, 51(3):341-366.
- Rowling, C. W. (1948). *Notes on Land Tenure in the Benin, Kukuruku, Ishan and Asaba Divisions of Benin Province*. Lagos: Government Printers.
- Ryder, A. F. C. (1969). *Benin and the Europeans, 1485-1897*. Humanities Press.
- Sheridan, M.J. (2004) The Environmental Consequences of Independence and Socialism in North Pare, Tanzania, 1961-88. *The Journal of African History*. 45(1) 81-102
- Suri, T. (2011) Selection and Comparative Advantage in Technology Adoption, *Econometrica*, 79(1):159-209
- Usuanlele, U. (1988). *State and class in Benin Division 1897-1959: A history of colonial domination and class formation*. MA thesis, Ahmadu Bello University, Zaria.

- Usuanlele, U. (2003). *Colonialism and the Environment: the Deforestation of the Rainforest of Benin and Ishan Divisions, 1897-1960*. Ph.D. thesis, University of Ibadan.
- Usuanlele, U. (2009). Communal plantation system in Benin Province 1901-1924: Environmental conservation or deforestation? *Paper presented at the conference "Science Technology and Environment in Africa" convened by Toyin Falola at the University of Texas*.
- Van de Walle, N. (2001) *African economies and the politics of permanent crisis, 1979-1999* Cambridge University Press
- von Hellermann, P. (2005). *Things fall apart? A political ecology of 20th century forest management in Edo State, southern Nigeria*. PhD thesis, University of Sussex.
- von Hellermann, P. (2007). Things fall apart? management, environment, and taungya farming in Edo state, southern nigeria. *Africa*, 77(3):371.
- von Hellermann, P. and Usuanlele, U. (2009). The owner of the land: The Benin Obas and colonial forest reservation in the Benin Division, Southern Nigeria. *The Journal of African History*, 50(02):223–246.
- WALC (1916). NAUK, CO 879/117/9–10: Minutes of Evidence and Correspondence of the Committee on the Tenure of Land in the West African Colonies and Protectorates, African (West) nos. 1046–8.
- Weinstein, B. (1983) *The Amazon rubber boom, 1850-1920*. Stanford University Press.
- Woodruff, W. (1955). Growth of the rubber industry of Great Britain and the United States. *Journal of Economic History*, 15(4):376–391.
- Zeitlin, A. (2011) Understanding heterogeneity: Risk and learning in the adoption of agricultural technologies *Working Paper*