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Supplying and sustaining the nervous system of the world (c.1850 to 1939)

Introduction

> It is the duty of all States to foster, guard, and conserve the natural resources of the country …The King George V National Park…will create a permanent refuge for the fauna and flora of that portion of Malaya that lies directly around Gunong Tahan…It will [retain] the ancient beauties of a primeval wilderness.
>
> – Theodore Hubback, "Preserving Primeval Malaya for Modern Man," *The Straits Times*, May 10, 1939.

Between 1938 and 1939, Southeast Asia's first national park was negotiated into existence.[1] Located on the eastern side of the Malay Peninsula, the King George V National Park (renamed Taman Negara following Malayan independence from Britain in 1957) was formed by combining three bordering areas in the neighboring sultanates of Terengganu, Kelantan, and Pahang.[2] Theodore Hubback, a one-time rubber planter, engineer, and big-game hunter based in the eastern peninsular state of Pahang, took it upon himself to make the park a reality. First, he successfully harangued Britain's King George V for permission to survey the condition of the Malay Peninsula's forests and wildlife.[3] Following the results of this survey, he lobbied Sultan Sulaiman of Terengganu, Sultan Ismail of Kelantan, and Sultan Abu Bakar of Pahang to set aside portions of their lands towards this park, which they agreed to do as a silver jubilee gift to George, a fellow monarch.[4] Unlike the already existing forest reserves administered by the Straits Set-

Note: Research in this chapter is supported by the South, West and Wales Doctoral Training Partnership (SWWDTP2), which is funded by the Arts and Humanities Research Council (AHRC, part of United Kingdom Research and Innovation (UKRI).

1 H. Z. Pakhriazad et al., "Historical and Current Legislations of Taman Negara National Park Peninsular Malaysia," *Journal of Politics and Law* 2, no.1 (2009): 44 – 49.
2 Pakhriazad et al., "Historical and Current Legislations," 44.
3 Mathieu Guérin et al., "A favourable shift towards public acceptance of wildlife conservation in Peninsular Malaysia: comparing the findings of the Wild Life Commission of Malaya (1932) with a recent survey of attitudes in Kuala Lumpur and Taiping, Perak," *Malayan Nature Journal*, Special Edition (December 2017): 21 – 31.
4 Guérin et al., "A favourable shift," 22.

https://doi.org/10.1515/9783111611358-009

tlements and Federated Malay States Forestry Department (hereafter called the Forestry Department), which were expected to produce forestry products for commercial gain, the flora, fauna, and natural features of the new park would be protected from extraction, hunting, and commercial activities.[5]

Taman Negara's founding is often retold as a victory of one man's tenacity or, more neutrally, from the point when the three sultans agreed to its establishment.[6] This chapter will instead show that the foundations for Taman Negara, from concept to execution, were instead established earlier in 1850 with the success of the first submarine telegraph cable laid between Dover, England and Calais, France.[7] The key to the cable's "submarine" capability was a tree latex native to maritime Southeast Asia called gutta-percha, the best and only known undersea insulation plastic of its time.[8] Its thermoplastic properties enabled it to be molded into any shape when heated, hardening and retaining that shape when cooled.[9]

Simply put, without gutta-percha trees, the nineteenth-century revolution in global telecommunications that saw submarine telegraph cables laid across the world would not have been possible. Gutta-percha, this now-obscure latex, made global same-day cross-oceanic communications a reality for the first time in history. It was also the inspiration for the invention of commercial artificial plastic.[10] Not only was it waterproof and seawater resistant, but its insulation properties also improved with depth under seawater, hardening in cool temperatures without going brittle over time like rubber. Extracted from several species of trees (especially the *Palaquium gutta*, *Palaquium oblongifolium*, and *Payena leerii* trees, generally referred to as gutta-percha trees or Taban), the latex was known to be difficult to harvest due to how rapidly it hardened upon exposure to air.[11] It was also believed that industry-relevant gutta-percha only grew in the Malay Peninsula, and islands of Borneo, the Lingga and Riau archipelagoes, Singapore, and Sumatra.[12] As a result, the global cable network came at a price, the sacrifice of an estimated eighty-eight million trees, and what many at the time believed to

5 "Preserving Primeval Malaya."

6 Pakhriazad et al., "Historical and Current Legislations," 44.

7 G.L. Lawford and L.R Nicholson, *The Telcon Story 1850–1950* (The Fanfare Press, 1950).

8 Cassie Newland. "Economic Objects," in *A Cultural History of Objects in the Age of Industry*, ed. Carolyn L. White (London: Bloomsbury Publishing, 2022), 57–76.

9 Newland, "Economic Objects," 56.

10 Newland, "Economic Objects," 75.

11 Eugene de Obach, *Cantor lectures on gutta percha* (1898), 15., TCM/27/26, Telegraph Construction and Maintenance Company Ltd, Caird Library, National Maritime Museum, Greenwich, London.

12 Obach, "Cantor lectures," 15.

be its near extinction.[13] Politically, amongst the club of empires, the British and Dutch were seen to have been handed a monopoly on global communications due to their access to this specialized material that made this possible.

Thankfully, gutta-percha trees survived. Their current obscurity in modern-day society, however, disguises a complex late-nineteenth to early twentieth-century story about experimental sustainability in a transimperial world that has not yet been studied in historical scholarship. This chapter will show that, instead, from 1850 to 1900, it was not the British and the Dutch empires that monopolized the existence of global communications, but their trade partners in the Malay Peninsula and Indonesian Archipelago. The telegraph industry relied wholly on maritime Southeast Asia's centuries-old trade network, knowledge, and customs to access gutta-percha and learn its properties. These pre-colonial customs, economy, norms, and networks were preserved through the structures of local sultanates; themselves modeled off the memories of the many thassalocratic empires within the region that preceded them. For the British and Dutch empires to obtain the necessary materials to construct cables, posts, and telegraphs to showcase their enlightenment-driven empires, they had to appeal to the personal ambitions and priorities of local actors within this region. These latter parties monopolized forest access, gutta-percha knowledge, and labor.

By providing access to their gutta-percha knowledge and facilitating its supply, these maritime Southeast Asian actors became significant partners in the invention and construction of an effective global submarine telegraph cable network. The network would not have existed without them or their cooperation. This transimperial perspective challenges the conventional view that the world's first global telecommunications network was a European invention that was disseminated to the world.[14] Instead, through the myriad materials this network required, sourced from different regions of the world, this global network is revealed as a truly global invention that necessitated the various local expertise related to these materials. This chapter uses gutta-percha as a case study of maritime Southeast Asia's contribution.

At the turn of the century, however, power in gutta-percha's homeland increasingly shifted into British and Dutch favor as the latex featured less in conversations about communications technology, and more in those around conservation and sustainability. So far, this environmental chapter in telegraph and

13 John Tully, "A Victorian Ecological Disaster: Imperialism, the Telegraph, and Gutta-Percha," *Journal of World History* 20, no.4 (2009): 559–79, here 575.

14 See Tully, "Victorian Ecological Disaster," and Bruce Hunt, "Insulation for Empire: Gutta-Percha and the Development of Electrical Measurement in Victorian Britain," in *The Victorians: A Botanical Perspective*, ed. L.M. Mendonça de Carvalho (Cham: Springer Nature, 2024) as examples.

gutta-percha history has remained underexplored but deserves as much focus as its extraction-based years.

In Southeast Asia, gutta-percha instigated the British colonial government to experiment with forest conservation and gutta-percha sustainability in the Malay Peninsula, passing anti-extraction and export laws there in 1900.[15] This act separated the peninsula even more from the rest of the Malay archipelagic world, where forest harvesting continued as before. In this conservation Petrie dish, Britain established a forestry department to cement itself as the authority over the peninsula's natural resources, while the world's largest cable manufacturer, the British Telegraph Construction and Maintenance Company (Telcon) established a private gutta-percha plantation to both discourage wild felling and conduct chemistry experiments on gutta-percha in hopes of furthering cable innovation.[16] Back in Europe and America, industrialists established research departments to search for and create alternate materials for gutta-percha and recycled existing gutta-percha supplies.[17]

In most telegraph histories, gutta-percha is broadly discussed in early chapters to explain the origins of submarine telegraph cables. Following from these works, this chapter uses an inverse approach, broadly discussing submarine cables to explain the origins of gutta-percha's industrial demand, but using a gutta-percha-centric study instead. This simple shift opens new perspectives on telegraph history, including its environmental impact and influence on environmental movements, and provides deeper insight not just into the telegraph industry's relationship with governments, but also with non-Western regional actors.

This work is not the first to use this approach (Helen Godfrey's book *Submarine Telegraphy and the Hunt for Gutta Percha* is the most extensive work using this approach to date), but it is still relatively new in telegraph historiography, leaving much to be discovered. Where Godfrey focused on Borneo, this work examines the Malay Peninsula more closely, made distinct due to its forestry laws. It is essential to continue this approach of centering gutta-percha because it necessitates centering its Southeast Asian homeland within the context of telegraph his-

15 Helen Godfrey, *Submarine Telegraphy and the Hunt for Gutta Percha: Challenge and Opportunity in a Global Trade* (Leiden and Boston: Brill, 2018), 188.

16 Lawford and Nicholson, *Telcon Story*; J.W. Sewill, draft of an article entitled "The Great Pahang Flood of 1926," RCMS103 BAM, Fonds, Archives of the British Association of Malaysia and Singapore, Cambridge University Library, Cambridge, United Kingdom.

17 Chemical Branch Report on Gutta-Percha Resin substitute for sticky tape, Henley's Research Department, DOC/WTHTN/3/13, PK Porthcurno Archives, Porthcurno, United Kingdom; C. de F. Chandler, "Submarine Telegraph Cables," *Scientific American* 127, no.2 (August 1922): 90–91; Lawford and Nicholson, *Telcon Story*.

tory. This approach reveals previously overlooked actors and knowledge on how local interests and environments shaped innovations in communications technology. It becomes especially apparent that European botanical knowledge about gutta-percha was strongly influenced by their Southeast Asian trade partners. As harvesters, merchants, and rulers from these gutta-percha homelands benefited greatly from exporting gutta-percha to Europe, the information they shared was colored through their own priorities regarding their profits, time, and personal power.

Additionally, this gutta-percha-centric approach encourages looking past submarine telegraphy's boom years into 1939. Where previously, gutta-percha was central to global communications, its scarcity became the catalyst for the British government in the Straits Settlements and Federated Malay States to establish the peninsula's first forestry department and for the British to work more closely with the Dutch on economic botany.[18] Gutta-percha becomes a lens through which we can see the maritime Southeast Asian world's transition to the more terrestrial norms introduced by Europeans, and how early twentieth-century experiments with industrial sustainability and conservation were directly influenced by gutta-percha's scarcity.

By stopping the gutta-percha story in 1900, it seems to end with the telegraph industry "destroy[ing] the very trees that made its existence possible."[19] While an apt warning to us and future generations, it is also important to continue this story into 1939 to examine how the industry's dependency on gutta-percha compelled it to attempt reversing this damage. Their approaches to sustainability and environmental control, as well as the impact these actions had, also offer valuable insights for our present and future attempts to resolve our own conflicts between extraction and sustainability.

This gutta-percha story, from accessories to cables and conservation, also emphasizes the importance of seeing environment, technology, and development as integrated parts. Studies on resource extraction are incomplete without also delving into the necessary conundrum of sustained availability and the impact of this resource on society, and vice versa. Gutta-percha enabled people to develop a means of overcoming an environmental challenge – in this case, the wide expanses of the oceans that hindered communication. However, telegraph technology was limited, both by physical access to gutta-percha's natural environment and social access through the communities that lived within this environment. This en-

18 "Gutta in Malaya," *The Straits Budget*, October 13, 1900; James Gilbert Watson, "The Wealth of the Jungle," *Inter-Ocean Magazine – A Netherlands East-Indies Magazine Devoted to Malaysia and Australasia*, January 20, 1928, PK Porthcurno Archives, Porthcurno, United Kingdom.

19 Tully, "Victorian Ecological Disaster," 579.

vironment would be subject to change, as gutta-percha's industrial success brought more attention from imperial powers to maritime Southeast Asia, where the cycle would repeat as in many other places in the world.

Feeding the network and feeding the myths (c. 1845 to 1900)

When European explorers or telegraph industrialists mentioned their local partners in the gutta-percha trade, it was usually to complain: the harvesters were unenlightened and simple natives who cut down gutta-percha trees indiscriminately with no regard for the future, merchants were unscrupulous scammers who diluted gutta-percha blocks to charge more money, and local rulers were so unfair to the previously mentioned natives that European colonizers would rule more benevolently.[20] At face value, these complaints evoked a chaotic and haphazard image of gutta-percha's homeland. Beneath the surface however, the complaints also communicated the telegraph industry's lack of control over their most precious ingredient at all stages of the supply chain, from sourcing to pricing, and labor. While Britain and the Netherlands had colonies in the Malay Peninsula and Indonesian Archipelago at this time, their influence was limited to specific port cities and not the interior where gutta-percha lived. Even this influence largely relied on agreements with local rulers.[21]

Such a chaotic and haphazard society would not have possessed the organization required to manage the supply-chain or structures required to successfully meet the global industrial demand for gutta-percha during the boom years of cable construction. Not only did this supply chain have to be rapidly adaptive as gutta-percha was not a popular forestry product before the 1840s, but the latex had to be extracted at levels previously unseen in maritime Southeast Asia's long commercial history.

This section argues that the first submarine telegraph cable network owes its existence to Southeast Asia's centuries-old maritime trade network; a sophisticated system that had been designed for global trade and evolved over time from before the second century to adapt to ever-changing and expanding definitions of

20 Non-exhaustive examples of such literature includes Obach, "Cantor Lectures"; Logan, "Gutta in Malaya," and more that will be discussed later in this chapter.

21 "Netherlands-India government gutta percha plantations – Tromp de Haas, W.R," 1908, University of Leiden Special Collections, KIT Collection, Br G 79–78, Leiden, the Netherlands.

"global."[22] As long as fellow merchants and markets were reachable by sea, the network could, and ideologically, should, connect and sell to them. In a 1468 letter from Sultan Mansur of Melaka to King Shō Toku of Ryukyu, he expressed the importance of these maritime commercial connections as a responsibility for common betterment: "…to master the blue oceans, people must engage in commerce and trade, even if their countries are barren…All the lands within the seas are united in one body, and all living things are being nurtured in love; life has never been so affluent in preceding generations as it is today."[23]

Where did this network come from? Due to its maritime-based archipelagic geography and proximity to East and South Asia, the region has been home to numerous commercial archipelagic empires that enriched themselves by establishing trading ports and exporting forest goods throughout the Indian Ocean and South China Sea.[24] The most famous of these is the Melaka Empire, which reached its height in the late fifteenth century and fell to Portuguese conquest in 1511. After its fall, Melaka gave rise to two successor states, founded by each of the exiled Sultan's sons – Perak and Johor.[25] The Johor Sultanate, which later became the Johor-Riau Empire, would eventually establish dominion over the islands to its south (now Singapore and the Lingga islands), islands to its east (now the Riau archipelago islands, stretching across to Natuna Sea to Borneo), and Indragiri in Sumatra to its west.[26]

The most popular telling of how gutta-percha came to the attention of European industry is set in Singapore. In this story, in 1842, a Malay merchant (or hunter or laborer, the texts do not agree on the profession, but it is possible that he was a combination of any of these, depending on the opportunity) in Singapore taught a Scottish doctor about gutta-percha's properties and sold him a blade with a handle made of the latex. By 1846, even before gutta-percha was used in submarine telegraph cables, industrializing European states had fallen in love with gutta-percha for similar reasons that plastic has become so essential to our society today.[27]

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22 Anthony Reid, *Southeast Asia in the Age of Commerce 1450–1680. Volume Two: Expansion and Crisis* (New Haven: Yale University Press, 1993), 1.

23 Reid, *Southeast Asia in the Age of Commerce, vol. 2*, 10.

24 M. C. Ricklefs, "The Arrival of the Europeans in Indonesia," in *A History of Modern Indonesia since 1300*, ed. M. C. Ricklefs (London: Red Globe Press, 1993), 23–24.

25 Leonard Y. Andaya, "Johor-Riau," in *Southeast Asia: A Historical Encyclopedia, from Angkor Wat to East Timor*, ed. Ooi Keat Gin (Santa Barbara: ABC-CLIO, 2004), 698

26 J.R. Logan. "The Orang Binua of Johore," *The Journal of the Indian Archipelago and Eastern Asia* 1, no.1 (1847): 261.

27 "Court of Common Pleas. Feb 6," *The Straits Times*, May 14, 1850.

Gutta-percha was used to make a large variety of products, ranging from small and intricate jewelry to large boats, to medical casts and listening devices.[28]

Before gutta-percha became a top-selling product in Europe, it was not a star forestry product for the communities based in the peninsula and Sumatra, these were usually aromatics and medicinal products such as camphor.[29] Local community uses for gutta-percha varied by area. Indigenous communities on the peninsula (hereafter called Orang Asli in line with the community's preferred naming) in Johor reportedly ate the seeds, while over the Malacca Strait in Sumatra, Minangkabau Malay communities in Siak also extracted vegetable oils from the seeds.[30] Other general uses included lining and waterproofing bowls, making sculptures and tools such as oxen whips, and handles for weapons and tools.[31]

With industrial demand coming from Europe in the 1840s, however, this changed. Temenggong Daeng Ibrahim, the most powerful man in the Johor Sultanate, saw an opportunity and declared a royal monopoly over gutta-percha.[32] He utilized Johor's centuries-long established trade network, including its manpower and connections, to specialize in supplying gutta-percha to the hungry European market. As profits and demand grew, the Temenggong forcefully relocated entire Orang Asli communities from their island homes in Singapore and the Riau-Lingga islands to Johor to scour those forests for gutta-percha trees.[33] Word of mouth brought in more labor as plucky entrepreneurs chased the rumored 400 per cent profits to further scour the islands between the Malay Peninsula and Borneo for more and more gutta-percha trees until it reportedly became extinct in Singapore, scarce in the Riau-Lingga archipelago, and increasingly difficult to find in Johor. During this time, those plying their trade on the seas also hijacked boats to steal others' gutta-percha harvests.[34]

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28 Logan, "Orang Binua," 263.

29 Carl L. Hoffman, "The 'Wild Punan' of Borneo: A Matter of Economics," in *The Real and Imagined Role of Culture in Development: Case Studies from Indonesia*, ed. Michael R. Dove, (Honolulu: University of Hawaii Press, 1988), 108.

30 Graham Brown. "Vulcanite or Gutta-Percha? That is the Question," *The Journal of Gemology*, 22, no.5 (1991): 293; Logan, "Orang Binua," 263; Newland, "Economic Objects," 58.

31 Logan, "Orang Binua," 295.

32 Logan, "Orang Binua," 295.

33 Logan, "Orang Binua," 295; Koh Keng We, "Gateway and Panopticon: Singapore and Surviving Regime Change in the Nineteenth-Century Malay World," in *Reframing Singapore: Memory – Identity – Trans-Regionalism*, ed. Derek Heng and Syed Muhd Khairudin Aljunied (Amsterdam: Amsterdam University Press, 2009): 39 – 68, 58.

34 "Received," *The Singapore Free Press and Mercantile Advertiser*, September 5, 1846; Obach, "Cantor Lectures."

This trade was so successful that Daeng Ibrahim's son Abu Bakar would later, with British and Dutch support, replace the existing Sultan and proclaim himself Maharaja of Johor.[35] Daeng Ibrahim's ability to call upon vassals from across the Johor-Riau Empire (Figure 1) should not have been possible. As of 1824, this state no longer existed. It had been broken up by the Anglo-Dutch treaty signed that year (Figure 2); the same parties who later supported Abu Bakar's ascension.[36] It is tempting to cast the British and Dutch colonial presence in the region in terms of absolute power due to their ability to use European laws to break up a centuries-old empire. Doing so, however, would be too simplistic, as this case also shows that by 1843, Daeng Ibrahim's influence did not begin and end at the southern tip of the Malay Peninsula.

Centuries-old customs and laws of vassal-client relationships, and the importance of continuing local cultural, social, and economic norms based on tradition and daily practice, simply held more influence on the ground than that of foreign powers. As for the British and the Dutch, they had to accept this disregard of their authority because Johor-Riau's still living trade networks controlled their access to gutta-percha, and therefore, to telegraph technology. Furthermore, as the telegraph network, along with its partner (the railway), were upheld as symbols of the civilizing force that only European-modelled empires could provide, Daeng Ibrahim's harvesters and merchants held the keys to "civilization" itself.

How did European empires find themselves relying on a defunct empire to make submarine cables a reality? Simply put, until 1900, local peoples held a monopoly on the knowledge of their seas and forests, leaving the gutta-percha supply entirely in their hands. Secondly, to the peoples living on the lands that the British and Dutch now claimed, their de facto realities were still more defined by generations of Johorean rule and its resulting long-standing client-vassal relationships, rather than the claimed dominion of empires that were based far away. For the purposes of gutta-percha, the local people's lived reality in Johor simply mattered more.

These realities are reflected in the lives of gutta-percha harvesters who plied their trade on both sea and land, as described through the writings of explorers and journalists in 1846 and 1847. In addition to showing that gutta-percha was already a much-demanded product before its use in cable construction, which was already rumored to be increasingly difficult to find, the importance of Johor-Riau's

35 H. R. C. Wright "The Anglo-Dutch Dispute in the East, 1814–1824," *The Economic History Review* 3, no.2 (1950): 229–39.

36 Benjamin Khoo, "Celebrations during a royal wedding," Biblioasia, National Library of Singapore, July – September, 2022, https://biblioasia.nlb.gov.sg/vol-18/issue-2/jul-sep-2022/wedding-bugis-uprising-singapore-riau/.

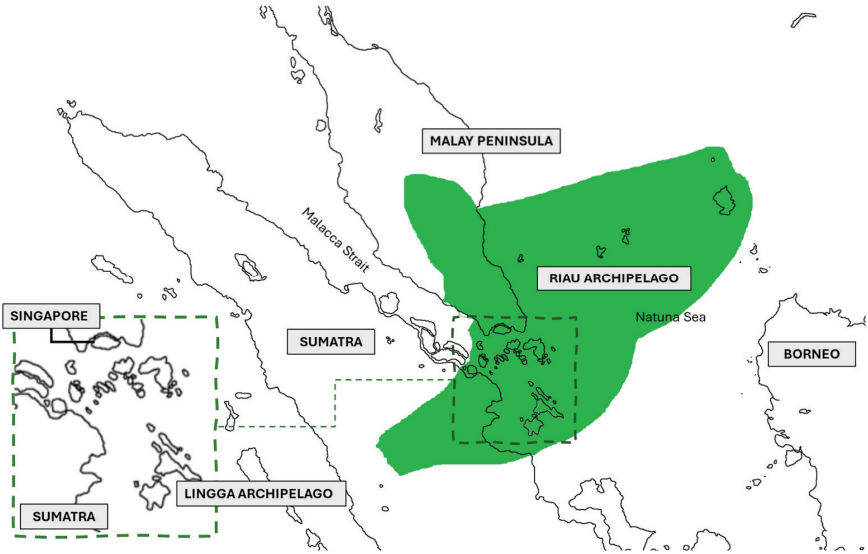

Figure 1: The green area shows the borders of the Johor-Riau Sultanate before the Anglo-Dutch Treaty of 1824. Author-drawn map based on information from: Khoo, "Celebrations during a royal wedding."

de facto power on the ground is apparent. However, while present, it would also be inaccurate to overemphasize their power. In both following examples, in the Johor Sultanate's interior and from Singapore island respectively, Britain's growing presence is evident.

Snippets from this 1846 article in Singapore provide a snapshot of the maritime gutta-percha harvest, while also showing the Malay maritime world and European terrestrial world overlapping:

> PIRACY – On Thursday last [Wahap] and 11 other [Singapore] Malays were proceeding to an island named Ayer Etam…to collect Gutta Percha, when about 7 o'clock in the evening they saw a number of persons on a spar…who were shouting and beating gongs… on turning a point they met two large boats containing [Galang] Malays, by whom they were immediately attacked. The pirates fired six times with muskets and rifles, by which one man was wounded…The Singapore boats had 1 kris panjang, 3 krisses, 9 spears, and 1 blunderbuss on board…The quantity of arms carried by the Singapore Malays is rather suspicious and might lead to an inference that if occasion offered they themselves were not unprepared to do a little piracy.[37]

37 "Received," The Singapore Free Press and Mercantile Advertiser. Note: Krisses are daggers originating from maritime Southeast Asia that have become famous for the wavy design of their

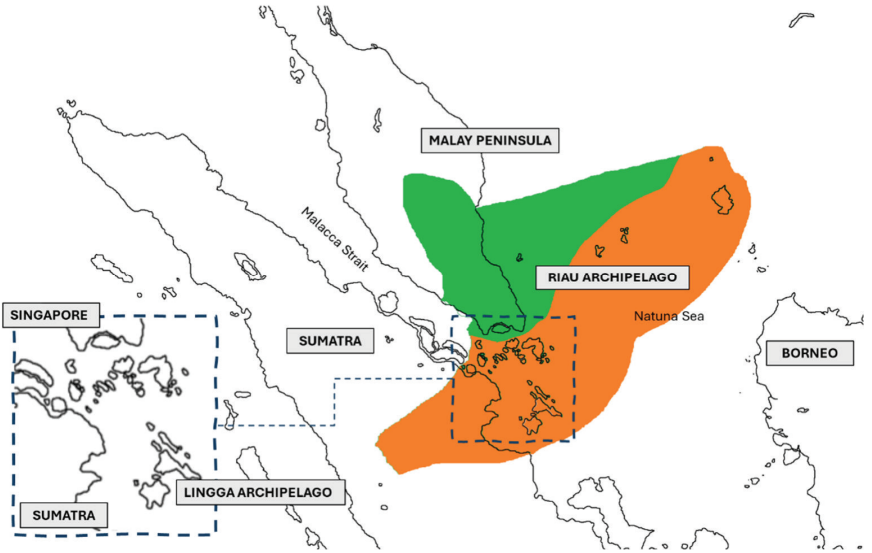

Figure 2: After 1824, the green area formed the new Johor Sultanate, and the orange became the Riau-Lingga Sultanate. By 1900, the green would include several entities: the Johor Sultanate, Pahang Sultanate, and British Crown Colony of Singapore. The Dutch would dissolve the Riau-Lingga Sultanate in 1911. Author-drawn map based on information from: Khoo, "Celebrations during a royal wedding."

By this point, Singapore was the capital of the Straits Settlements, a British colony made up of four small, spread-out territories on the Malay Peninsula: Penang Island, Singapore Island, and Melaka and Dinding on the west coast. However, the Lingga Archipelago (which Galang Island is a part of) was part of the Dutch East Indies and was a close neighbor to the south.[38] Wahap and his crew were taking a sea voyage that was the equivalent to how one would have a long daily commute to work today, based on a historical map where the Singapore and Lingga islands were not located in separate states. Wahap's ability to report the crime to a British authority, however, shows the blending of the old world with that of the new.

As for gutta-percha harvesting on land, an article from 1847 provides a glimpse into an Orang Asli village in the northern interior of Johor. The author

blades. A kris Panjang is a long kris, and a blunderbuss is a pistol that needs to be loaded in the same way as a musket.

38 Hydrographic chart, *Riouw en Lingga – Archipel. Blad 1*, Recorded in 1896–1899 by HNLMS Vessel Melvill van Carnbee, Sheet 1, 1:250,000 scale (Hydrographic chart, 1820). National Archives of Singapore, HC000032, Singapore.

calls them the Orang Binua, however, he also notes that this name simply means "people of the country," and their Malay neighbors referred to them either with offensive labels or generic names such as Orang Ulu (people of the interior).[39] As there are several possible peoples who could fall under this name, it is unclear which peoples they were. He describes this community as living a semi-nomadic lifestyle in the deep jungle, travelling between belukar, where they had previously planted groves with fruit trees and other edible plants such as durian, cempedak and plantains, within one to two days' walk of the other.[40] They would return after a few years to the appropriate belukar for a few months to harvest the fruit. These Orang Asli communities would also harvest valuable forest goods for barter with their Malay neighbors, such as rattan, camphor, damar, and gutta-percha; in return for goods such as rice, sugar, cloth, earthenware, iron tools, coconuts, and tobacco.[41]

There are broad cultural distictions made between Malay and Orang Asli settlements on the peninsula with regards to forest exploitation. From the fifteenth to nineteenth centuries, Malay traders living along rivers or more urban settlements along the coasts, earned their living through the maritime trade within their sultanates. Orang Asli usually collected forest resources for barter with Malay neighbors.[42] There were different Orang Asli peoples, with distinct ethnicities, spiritual and religious beliefs, and lifestyles across the peninsula. The same can be said for the peoples distinguished in literature (and in the current day) as Malay, but of course these are broad distinctions and intermarriage and cross-cultural exchanges were frequent. Trade with the Orang Asli was controlled by the leaders or headmen (*Penghulu*) of Malay settlements along key river points, usually by limiting access to outsiders through the rivers that led into the meeting places where the Orang Asli would barter their wares.[43] Once traded, these forest goods would be sold through the peninsula's riverine highways until they crossed the straits and seas in this archipelagic region to arrive in an urban center such as Singapore (or in older times, Melaka), to be repackaged and shipped overseas.[44]

39 Logan "Orang Binua," 259. Note, belukar means secondary jungle.

40 Logan "Orang Binua," 261.

41 Logan "Orang Binua," 279.

42 Abu Talib Ahmad, Mahani Musa, Nazarudin Zainun, Nasha Rodziaadi Khaw, Hisham Atan Edinur, and Geoffrey Keith Chambers. "A multidisciplinary account of the Orang Asli in Peninsula Malaysia." in *Resource use and sustainability of Orang Asli: Indigenous communities in Peninsular Malaysia*, eds. Mohd Tajuddin Abdullah, Candyrilla Vera Bartholomew, and Aqilah Mohammad (London: Springer Nature, 2021), pp. 157–188, 164.

43 Logan "Orang Binua," 286.

44 Logan "Orang Binua," 261.

This distinction is worth mentioning because of how their somewhat distinct gutta-percha knowledges were eventually institutionalized in imperial science. One glaring example is the name "gutta-percha" itself, the Malay name used to represent the tree latex preferred by submarine telegraph cable manufacturers. In the 1847 article, the Orang Asli harvesters told the author that gutta-percha was the name of an inferior tree latex, but their name for the superior latex was Taban.[45] Although the word taban would later be used interchangeably with gutta-percha, the latter won out as the more popular name that was adopted amongst the imperial public, in the cable industry, and in science. In this small example of who held more influence over the information passed to the cable industry, it is not surprising that the name preferred by Singapore and Johor's merchants won out over that of the harvesters. After all, Europe's popular exposure to the latex occurred in Singapore, which also became the center of the gutta-percha trade due to the Johor-Riau trade network.

In Johor and Singapore, European botanists harvested local knowledge of gutta-percha and its properties, whether through merchants or harvesters. Given these realities, it makes sense to see the early success of submarine cable adoption and construction as a product of transimperial collaboration between European and Johor-Riau empires. As examples such as how taban became gutta-percha show, however, plenty of knowledge was transformed in transport or translation. As this transformed knowledge became institutionalized, it would have a lasting impact on the technological and scientific research that depended on it.

One such example is the central belief that industry-specific trees only grew on the Malay Peninsula and islands of Borneo, Riau, Singapore, and Sumatra. The botanists, chemists, and other agents specializing in gutta-percha on behalf of either the cable companies or Western empires failed to notice that the "native" distribution of the most demanded gutta-percha trees conveniently aligned with the old borders of the Johor-Riau Empire. In a maritime region where borders were either drawn across seas or dense jungle, the geographic range of the trees should not have been so serendipitous. Indeed, they were not. The trees had a wider spread that included the Philippines, but that gutta-percha was mixed with the rest of the supply from Borneo and their actual origins deleted in the process.[46] Efforts to promote the Philippines as an alternate and non-British or Dutch monopolized source, failed, indicating that new parties could not break into the early stronghold established by the Johor-Riau network.

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45 J.R. Logan, "Range of the Gutta Taban Collectors and Present Amount of Imports Into Singapore," *The Journal of the Indian Archipelago and Eastern Asia* 2 (1848): 529.

46 Penoyer L. Sherman, *The Gutta Percha and Rubber of the Philippine Islands* (Manila: Department of Interior Bureau of Public Printing, 1903), 18.

European gutta-percha experts did not acknowledge or realize that the reports they heard about the trees' limits were as much commercially driven as natural. Gutta-percha prices rose not only because of increasing demand, but also because the supply was unreliable due to its reputed scarcity.[47] An aspect that is not directly acknowledged in historical documents is that gutta-percha supply also wholly relied on harvesters finding it worthwhile to access the difficult areas where the trees grew – both physically and socially. Of course, it also benefited local merchants to tell their foreign buyers that prices had to rise as this specialized resource was becoming increasingly limited.

Sustaining "civilization" (1900 – 1933)

The sustainability conundrum around gutta-percha's excess extraction and increased societal expectation for fast communications was, at heart, a familiar problem for industrializing states around their needs for mass production and sustaining essential materials. With regards to forestry and wood resources, it was thought that a solution had been found in the mathematically based German approach to forestry management that was implemented in the 1820s.[48] This approach challenged foresters to calculate how much wood any specific forest could mass-produce over one to two centuries to meet the long-term demands of industry.[49] Faced with a mathematical question, German foresters turned to conceptualizing "average" trees (*Normalbaum*) for use in their calculations, i. e., ideal trees with predictable traits such as sustained yields and mass.[50] Over time, the *Normalbaum* was transformed from conceptual average into reality as foresters encouraged the trees under their care to grow into this predictable ideal, creating forests populated with trees of the same type, size, and age.[51] In this way, German forestry management championed the uses of government-controlled forest reserves, which had effectively become tree plantations. Thus, forest resources could be

47 As seen in a letter from H.W. Jewsbury and Co. to Telegraph Construction and Maintenance Company, 24 October 1870, TCM/21/13, National Maritime Museum, Greenwich.

48 Ravi Rajan, "Imperial Envrionmentalism or Environmental Imperialism? European Forestry, Colonial Foresters and the Agendas of Forest Management in British India, 1800 – 1900," in *Nature and the Orient,* ed. R. Grove, V. Damodaran, and S. Sangwan (Oxford: Oxford University Press, 1998), 329.

49 Rajan, "Imperial Environmentalism," 331; "Forest Administration in Malaya," *Nature* 143 (1939), 571 – 572.

50 Rajan, "Imperial Environmentalism," 331.

51 Rajan, "Imperial Environmentalism," 331.

controlled by the state and meet market demands in a predictable manner. Seemingly an answer for the gutta-percha problem, this forest-management approach was brought to the Malay Peninsula in 1901.[52]

It must be said, however, that sustaining natural resources was not just a problem for industrializing states in the 1800s. As previously mentioned, for centuries, the kingdoms of maritime Southeast Asia had relied on increasingly globalized trade from their entrepot capitals for their livelihoods. While these first- to seventeenth-century trades did not have to manage the same excesses in demand as eighteenth-century industrializing states, demands were still high enough to exhaust best-selling resources if not managed. On the Malay Peninsula, some strategies for managing this challenge included royal monopolies on popular goods or integrating their agency into local beliefs.[53] For example, camphor was another forestry good that originated from the region (Borneo and Sumatra are especially credited).[54] It became popular for its various uses, including medicinal, spiritual, culinary, and beauty practices across Eastern Asia, Southern Asia, the Middle East, and Europe, but the origins of this trade and its popularity are so ancient that it is difficult to pinpoint its beginnings with accuracy. The earliest known mention of camphor is in the Classical Sanskrit medicinal text, the *Suśrutasaṃhitā*, which various scholars have argued originated sometime between the pre-fourth to the sixth centuries.[55]

By 1847, camphor was still a much-demanded forest commodity, and Logan provides one example of how it was sustained in northeast Johor despite centuries-long global demand.[56] He noted that both Orang Asli and Malay communities in the region shared the same beliefs and practices around camphor collection, writing, "While searching for it they abstain from certain kinds of food, eat a little earth and use a kind of artificial language called the *bássá kápor* [camphor language]."[57] These practices are even credited within the local community with sustaining camphor trees:

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52 "Forest Administration in Malaya," 571.

53 Jeyamalar Kathirithamby-Wells, *Nature and Nation: Forests and Development in Peninsular Malaysia* (Copenhagen: NIAS Press, 2005), 10.

54 G. J. Meulenbeld, "Suśruta and the Suśrutasamhitá," in *History of Indian Medical Literature*, vol. 1a, ed. G. J. Meulenbeld (Groningen: Robert Forsten, 1999), 345; Ranabir Chakravarti, "Aroma Across the Sea, Camphor – To India, beyond India c. 1000 to 1300CE," in *Early Indian History and Beyong, Essays in Honour of B.D. Chattaopadhyaya*, ed. Osmund Bopearachchi and Suchandra Ghosh (Delhi: Primus Books, 2019), 383.

55 Meulenbeld, "Suśruta and the Suśrutasamhitá," 348–350.

56 Logan, "Orang Binua," 264.

57 Logan, "Orang Binua," 263; Kathirithamby-Wells, *Nature and Nation*, *xxx*.

> It is believed that if care be not taken to use the [*Bahasa Kapor*] great difficulty will be experienced in finding camphor trees, and that when found the camphor will not yield itself to the collector. Who-ever may have been the originator of this superstition, it is evidently based on the fact that although camphor trees are abundant it very frequently happens that no camphor can be obtained from them. Were it otherwise, said an old Binuá who was singularly free from superstitions of any kind, camphor is so valuable that not a single full grown tree would be left in the forest.[58]

Gutta-percha trees were not given the same level of care. Interestingly, they informed Logan that the good-quality Taban only came from mature trees and believed this would spare younger trees to meet future demand.[59] In just three more years, however, gutta-percha's indispensable role in submarine-telegraph cables would drive demand to previously unimagined levels in the peninsula.[60]

In response, the Federated Malay States and Straits Settlements Forestry Department was founded in 1900.[61] Like its sibling departments established in Australia, the Cape Colony, Ceylon, Cyprus, the Gold Coast, Kenya, Mauritius, Nigeria, and Sierra Leone, the department was an offshoot of the Imperial Forest Department that the British Raj had founded in India in 1864. Headed by Dietrich Brandis, a German forest officer, its staff were trained in Germany and France before moving on to found other forestry departments in the same vein as India's.[62]

State-controlled German forestry management was not only an effective way for the state to increase and centralize its power over natural resources, but by promising resource sustainability through science and mathematics, it was also upheld as a practical implementation of enlightenment ideals.[63] When it was first introduced in German states, foresters faced increasing vitriol from villagers who had lost their access to nearby forest lands and resources.[64] In return, foresters blamed local practices for forest damage, accusing them of being uncontrolled and short-sighted.[65] As the opposing other, villagers and their local practices were cast as uncivilized, wasteful, and therefore as inappropriate for land management. This practice of blaming local customs and practices as inferior, uncivilized,

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58 Logan, "Orang Binua," 263.

59 Logan, "Orang Binua," 263.

60 Kathirithamby-Wells, *Nature and Nation*, *xxx*.

61 Richard Hölzl, "Historicizing Sustainability: German Scientific Forestry in the Eighteenth and Nineteenth Centuries," *Science as Culture* 19, no.4 (2010): 431–460.

62 Hölzl, "Historicizing Sustainability," 446–447.

63 Hölzl, "Historicizing Sustainability," 446–447.

64 Hölzl, "Historicizing Sustainability," 447; De Haas, *Netherlands-India government gutta percha plantations* (Tjipetir: Batavia Government Gutta-Percha, 1908).

65 Hölzl, "Historicizing Sustainability," 447.

and responsible for environmental damage remained when the technique was exported on a global scale.

"Native" harvesting practices took the blame for gutta-percha's rumored increasing rarity.[66] Although harvesters explained that they utilized tree-felling to meet the large-scale demand for gutta-percha in the time required, industrialization was not considered a valid enough reason for unsustainable practices. In line with German forestry management, Europeans sought a civilized system of resource extraction, to meet the global demand for cables and preserve the flora and fauna and natural resources required to build the foundation of civilized society. By the 1900s, it was not only infrastructure such as posts, rail, and telegraph that were the symbols of civilized empires, but also the conservation of natural Edens – that is, the natural flora and fauna that many empires laid claim to. The link between the telegraph and forest conservation as a responsibility of a civilized empire is directly acknowledged by the Dutch government over the founding of the government gutta-percha plantation on Java Island in 1900:

> For the insulating of 236,840 miles of submarine cable, it would thus be necessary, at a moderate estimate, to fell twenty-seven million gutta-percha trees. With these figures before them and bearing in mind the great interest that all civilised nations have in common in the continued existence of the submarine cables, the Netherlands Indian Government soon realised that on their part steps must be taken to prevent the entire extermination of the gutta-percha yielding trees.[67]

The Dutch plantation was not just an opportunity to showcase the Dutch empire's botanical knowledge, it was also a fallback after they were forced to acknowledge their limited control over local harvesters. As described by Tromp de Haas, the Dutch government's superintendent of plantations, rules to restrict harvesting to mature trees failed because "in practice…the maintenance of these regulations in the almost inaccessible uninhabited, virgin forests of Sumatra and Borneo was most difficult, if not impossible."[68] At their Tjipetir Plantation, the Dutch intended to introduce further scientific innovations by extracting guta-percha from mechanically harvested leaves from young trees (called the Ledeboer method). After the trees reached maturity at around fifteen to thirty years, they would tap gutta-percha from the trunk.[69] Armed with German forestry as a conceptual background and Dutch plantations as practical examples to emulate for local conditions, the British hoped to apply these enlightenment principles to conserving

66 De Haas, *Netherlands-India,* 2.
67 De Haas, *Netherlands-India,* 2.
68 De Haas, *Netherlands-India,* 2.
69 De Haas, *Netherlands-India,* 9.

natural forest resources and gain more centralized control over the Malay Peninsula.

By 1900, despite having the Straits Settlements colonies and the sultanates of Negeri Sembilan, Perak, Pahang, and Selangor as a centralized protectorate under the Federated Malay States, Britain still did not have official control over the entire peninsula. There were five remaining sultanates required to achieve this goal. Four of them, Kedah, Kelantan, Perlis, and Terengganu, were vassals to the Kingdom of Siam to the north, and Johor maintained its independence. This changed in 1909 when Britain signed an agreement with the Kingdom of Siam to become the new suzerain of the four northern sultanates, naming them the Unfederated Malay States.[70] Johor, the same sultanate that controlled the early gutta-percha trade, was the last holdout. They agreed to become a British Protectorate in 1914 after a five-year political tug-of-war between Sultan Ibrahim and British officers.[71]

In 1905, the Telegraph Construction and Maintenance Company (Telcon), Britain's largest cable manufacturer, established Selborne Plantation in Pahang based on the Tjipetir model.[72] Over the next thirty years, both plantations failed to curb wild felling or turn a profit.[73] As the Ledeboer method relied on harvesting leaves mechanically for efficiency, trees had to be planted fairly close together to accommodate the machine.[74] When it became clear that planting based on mechanical convenience was ineffective for growing gutta-percha trees, the plantations had to start again, allowing for space and shade for the young seeds to grow.[75] Still, the machinery for separating gutta-percha from leaves was available, so the companies asked for leaves and small branches from trees, believing that this practice would still aid the tree populations by saving them from felling. This request had the opposite effect, as time-strapped harvesters felled young trees that resembled branches instead.[76]

Effectively, the plantations did not achieve their stated goals: encouraging sustainable gutta-percha harvesting methods and simply serving as sites of enlightened scientific understanding. This would not be a surprise considering how

70 Godfrey, *Submarine Telegraphy*, 118.

71 Nesamalar Nadarajah nee Ramanathan, "The Struggle for Control, 1910–1914," in *Johore and the Origins of British Control, 1895–1914* (Kuala Lumpur: Arenabuku, 2000), 179.

72 A.B. Walton, Selborne Estate, Report, 20 September 1930, 1957/0638393, National Archives of Malaysia, Kuala Lumpur.

73 Walton, "Selborne Estate"; Godfrey, *Submarine Telegraphy*, 118.

74 Watson, "The Wealth of the Jungle."

75 Walton, "Selborne Estate."

76 Godfrey, *Submarine Telegraphy*, 118.

they were envisioned as a fresh start and replacement for local harvesting methods. Reputationally, however, the plantations were a success story for both Britain and the Netherlands. Their effectiveness mattered less than how their presence was received back in imperial nations – for Britain, the Forestry Department and plantation further cemented their image as the creator and master of the global telegraph cable network; and for the Dutch, as scientific masters in expanding the priorities of civilized (i. e., imperial) nations. Most importantly, perhaps, was claiming control over the gutta-percha supply, the key to one of the most important symbols of enlightened civilization.

Plantations served another role that was essential to imperial nations, which justified their dominion over resource-rich lands. Although there were few gutta-percha plantations, their existence promoted the plantation model as a preferred means of obtaining and controlling forest produce. Where plantations were established, transport and settlements needed to be built to support and incorporate them into the European-based legal trade network. They were part and parcel of a land-based system to replace the former maritime-based riverine trading highways that led directly into the forest.

The Forestry Department made up another part of that system. By appointing itself as the superior caretaker of the peninsula's flora and fauna, and making the sale and export of gutta-percha illegal, it challenged the local monopoly over the forest. Despite demonizing local harvesting practices, the peninsular-based Forestry Department knew that they could not effectively conserve or claim any forest lands without local staff and knowledge. Local harvesters and forestry staff were also thus essential to this sustainability mission. Following the peninsular ban on gutta-percha exports, the Forestry Department hired former harvesters for expeditions to find remaining gutta-percha trees, after which, these trees were tallied and placed under protection.[77] This strategy was effective, as former harvesters were given new incentives to reveal the locations where they had previously left trees alone. As a result, trees were tallied in forests where they were thought already extinct, such as in Melaka in 1901. In just twenty years, however, the changes that Britain brought to the peninsula led to the drying up of local forestry knowledge. Writing in 1928, James Gilbert Watson, a government forest economist, lamented the opportunity cost of lost forest lore:

> the number of Malays versed in jungle craft and jungle lore is rapidly dying out. It is becoming increasingly difficult even to secure information about, and practically impossible to pro-

77 "Gutta Percha in Selangor," *The Straits Times*, May 23, 1901.

> cure supplies of products which individually occur in insignificant quantities but which collectively are of incalculable value.[78]

Gutta-Percha turned Britain's attention over to maritime Southeast Asia and gave its empire a good reason to consolidate more control over such vital resources. To properly accomplish this, the colonial government needed to either take over the centuries-old maritime trade network or replace it altogether. From 1874 to 1931, they opted to combine the smaller railroad lines in disparate states to form the Federated Malay States Railway.[79] Eventually covering areas in the later-acquired Unfederated Malay States, this new railway became the new main thoroughfare for resource and commercial transport on the peninsula. Stretching from Singapore in the south to Perlis in the north, it replaced the riverways as the legal center of peninsular movement and economic life. The riverine network did not entirely disappear, however, remaining an effective alternative for smuggling or trade away from official eyes.

As previously mentioned, Britain kept their experiment with sustainable gutta-percha on the Malay Peninsula. In the lands they claimed in Borneo, gutta-percha extraction continued as before.[80] Forest officers also had economic responsibilities to identify resources that could have industrial use and sell these to companies back in Britain.[81] However, the sultanates that made up the peninsula were not colonies, but protectorates where the sultans still retained power over local cultural and religious affairs.[82] Although the balance of power on the peninsula was shifting towards British interests, it was also within British interests to maintain positive, or at least working, relations with the sultans.

Conclusion

Within this context of a rapidly transforming peninsula, spurred on by gutta-percha and global communications, the foundations for maritime Southeast Asia's

78 Watson, "The Wealth of the Jungle,"693.

79 Amarjit Kaur, "Road or Rail? – Competition in Colonial Malaya 1909–1940," *Journal of the Malayan Branch of the Royal Asiatic* Society 53, no.2 (1980), 45–66.

80 Godfrey, *Submarine Telegraphy*, 79.

81 Note of interview with Mr. B.H.F. Barnard, Deputy Conservator of Forests, Malaya, 12 March 1928, Gutta Percha and the Federated Malay States, AY4/2009, The National Archives, Kew.

82 Eleanor Choo, "A Shared Frontier: Interrelationships of Power Through Iron on the Malay Peninsula (1920–1941)," in *Southeast Asia as a Site of Imperial Contestation*, ed. Amy Freedman and Joseph Tse Hei-Lee (New York: Pace University Press, 2022), 69–70.

first National Park were laid. Beginning with a centuries-old legacy of maritime trade built on forestry goods, gutta-percha was introduced to an enlightenment-driven, industrializing Europe as the key to making the world's first global telecommunications network a reality. As these worlds collided and negotiated their merger, they adjusted to the opportunities and restrictions of each other's norms. On the Malay Peninsula, where Britain decided to experiment with sustainable gutta-percha, they brought their ambitions of centralized bureaucratic control and their enlightenment-inspired industrialization. Hand-in-hand with that industrialization, however, came their approach to sustainability. This brought changes in the landscape as rivers and forests were changed to meet British industrial needs and present the appearance of sustainability.

As the public in Britain fell in love with gutta-percha from their introduction to it in 1843, and then to their fascination with the telegraph, they heard about the tree's harvesting methods and scarcity. Due to fears that they would lose the telegraph network, and inspired by forestry management practices from the continent that strengthened the narrative of civilized enlightenment, a strong trend in support of conservation was transported back to the Malay Peninsula. This was the background that inspired Theodore Hubback, the one-time plantation manager, to petition for the founding of a national park – different from a reserve, it would be exempt from resource extraction or profit motives. Although he is often credited with the park's founding, he could not have succeeded without both the support of the European public on the peninsula and the neutrality of the Malay aristocracy to the idea.

Despite his strong personality, Hubback's complete vision for the park was not realized. He had advocated for the park to be free of people itself, pitting himself against the local villages that had long relied on gathering resources from neighboring forests. Although in Germany, forest management was used to restrict local usufruct rights, on the Peninsula, British civil servants objected to Hubback and lent their weight behind protecting these rights. Why did they do this? The situation was different because Britain had not (as of 1939), colonized the peninsula, and needed to keep the sultans as partners. The National Park had been established only because Britain agreed to the conditions set by the Sultans of Pahang, Kelantan, and Trengganu. For example, in Pahang, the Sultan stipulated that surrounding villages retain their rights to collect and tap resources from the forest, as well as utilize them at burial grounds.[83] British civil servants stood by this agreement against Hubback.[84]

83 Memorandum about Pahang Enactment No.2 1939, 20 July 1949, File no.69 – 49, King George V National Park. State Archives of Pahang, Kuantan, Pahang.

It is also possible that these administrators learned from their history in the peninsula. Their strategies worked best when they cooperated with local knowledge and what was already there, for example, in their forest reserves where they hired locals and surveyed the forests rather than tried to drastically change them. Gutta-percha plantations only met with narrative success but otherwise failed due to their approach that disregarded the natural environment and local practices. Development, therefore, was limited to what the environment would allow. Technology enabled some pushback, with the railway succeeding at connecting the north of the peninsula to Singapore and laying down a framework not just for replacing the old trade routes on the rivers, but for forming a newer centralized identity that combined what used to be several different sultanates.

This, too, was not entirely devoid of local interests, however. For a region that had thrived so long on maritime connections and international trade, it made sense that local practices adapted well to the commercial land-based infrastructure that partially replaced their riverine highways. These trains and roads connected the region to the new maritime-based global communications system for the industrial age – the submarine telegraph cable network that was the heir to the trade routes of old.

84 Memorandum about Pahang Enactment.