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*A Moving History of Middle Sumatra, 1600–1870*¹

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Introduction

The history of the early modern Malay world has been told largely in terms of processes of Islamization, the rise and demise of states, European voyages of discovery, trade with China, India and Europe, and colonial conquest. With a few important exceptions, these studies underestimate, if not ignore, the role of transportation in the historical transformations of Southeast Asia. Just as Clive Ponting's (1992) well-known *A green history of the world* rewrites the world's history in ecological terms, this article aims to describe the political and economic history of Middle Sumatra in terms of transportation of goods and people. Hence this is a moving history.

I do not wish to propose a major overhaul of the historiography of Sumatra, but believe that a thorough understanding of transportation helps to see familiar historical facts in a clearer, and sometimes different, light. The body of the text gives a detailed overview of the transportation network in Middle Sumatra between 1600 and 1870. For the most part, the history of transportation in Middle Sumatra has not yet been written and is valuable in its own right. Middle Sumatra is the area covered by the present provinces of West Sumatra, Bengkulu, South Sumatra, Jambi, and Riau. From around 1600, information about Sumatra began to flow in European circles, and by 1870, Dutch colonial control had become firmly established and was about to steer the island towards a new economic course.

¹ This article forms part of a research project on environmental changes in Middle Sumatra between 1600 and 1870. I am grateful to the Royal Netherlands Institute of Southeast Asian and Caribbean Studies (KITLV) and the Netherlands Foundation for the Advancement of Tropical Research (WOTRO) for their financial support that allowed me to delve into the national archive of Indonesia. I would also like to thank Rivke Jaffe for improving my English.

In the last two sections I take the analysis one step further and answer the question: in what ways did the transportation network influence the economic and political changes on the island? Although I do not make an attempt here to compare Sumatra with other parts of the region, I believe that the findings are relevant for other areas in the Malay world.

The importance of transportation is demonstrated by the immense symbolic power of some historical routes. The Nile, the Mississippi, and the Suez Canal are but a few examples of water routes that have inspired novelists. The Trans-Siberia Railway and the Orient Express are perhaps the most celebrated railways. The Roman Via Appia,² the Inca Roads over which relay runners carried messages at a speed of 400 km per day (Von Hagen 1957), the caravan routes of the Sahara, the Silk Route, *la voie sacrée* leading over 67 km from the base at Bar-le-Duc to the battlefield of Verdun, the Great Ocean Road in southern Australia, the highways of the Third Reich, the Trans-Amazon Highway, the Ho Chi Minh Trail, and Route 66 are all very famous roads, albeit for varying reasons.

With these examples in mind, practically every historian will agree that transportation plays a key role in the centralization of states, the subjugation of isolated insurgent peoples, the economic development of peripheral regions, the exchange of ideas, and the mental maps that people make of their world. Its role is so obvious that transportation is often simply taken for granted: an element of the landscape in which more exciting human dramas such as campaigns, mining and the opening of plantations are staged. Even today, 'because it appears so self-evident, there has been comparatively little work undertaken on the role of transport in economic development' (Rigg 1997: 172), and Southeast Asian national governments and multilateral development banks have invested large sums in road construction rather uncritically (Colombijn 2002).

The obvious, however, should never be overlooked, and fortunately there are a number of interesting historical studies that do not neglect transportation in Sumatra. Several historians have remarked upon the importance of the monsoon. Ships sailing either from the Middle East and India to China or vice versa had to wait in the Straits of Malacca for a change of monsoon in order to pursue their voyage with

² The roads of ancient Rome have been analysed by Ray Laurence (1999) in an outstanding book that, more than any other work, demonstrates the kind of analysis I had in mind while working on this article.

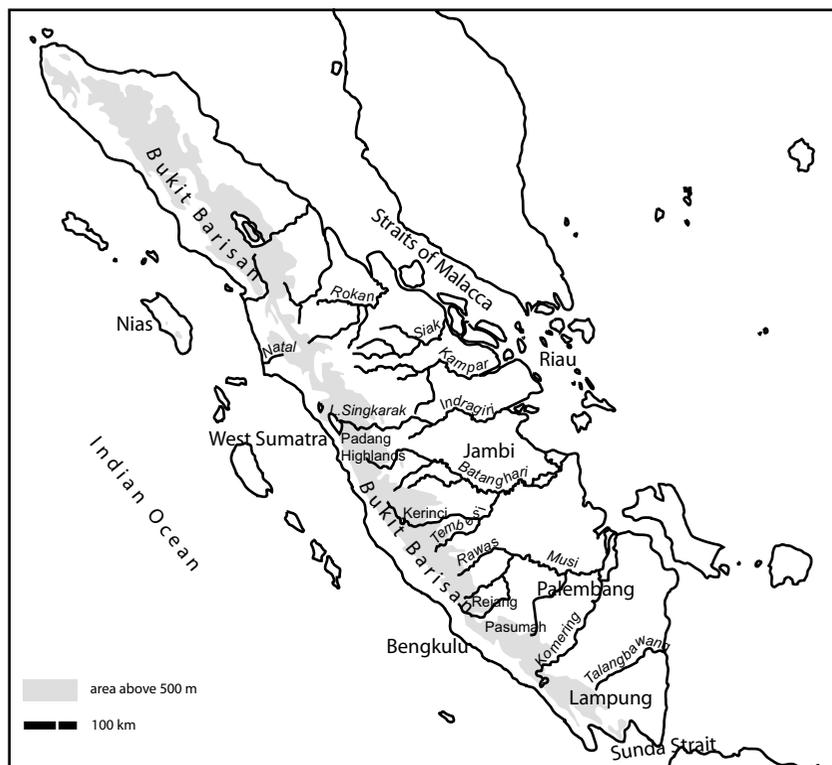
a favourable wind. This forced interruption led to the existence of a genealogy of major entrepôts in the Straits, from Sriwijaya via Malacca and Riau to Singapore (see for instance Van Leur 1955: 165–6, 193–4; Meilink-Roelofs 1962: 13, 37; Reid 1993: 36–53, 64–7). Following Bronson (1977: 43), the term dendritic (tree-like) model has gained acceptance. The dendritic model refers to the rise of precolonial states in river systems in East Sumatra. The ports at the river mouths controlled all interior shipping in the hinterland; political-economic subcentres developed at the branches of the rivers (Andaya 1995; Colombijn 2003; Hall 1985: 13–4; Kathirithamby-Wells 1993: 78–81; Reid 1993: 53–7). Gusti Asnan has written a detailed study of trade and shipping in West Sumatra in the nineteenth century (Asnan 2000, 2002). Akira Oki (1986) has analysed the river trade in Middle Sumatra in the nineteenth century. While these publications form a base on which to build, they also leave many questions unanswered.³ In this article I combine these older insights with new information collected from Dutch and British archives and travel reports.

Ecological and Political Context

Sumatra covers an area of 434,000 square km, and measures 1,650 km from north to south, and 350 km from west to east at its widest point (Map 1).⁴ Its most distinctive feature is the Bukit Barisan mountain range, which stretches from the north to the south tip. The Bukit Barisan forms the backbone of Sumatra and divides the island into two unequal parts: the narrow west coast and the wider half of hills and alluvial lowland in the east. The Bukit Barisan itself is bisected

³ In addition to the works mentioned here, there are two good monographs on transportation worth being mentioned, although they deal with a later period. Amarjit Kaur (1985) has written on transportation in Malaya (1870–1957). The railway system, in competition with roads, facilitated the transformation of the peninsula into a lopsided export economy, which in its turn produced a plural society and new settlements on the west coast. Joep à Campo (1992) produced a voluminous work on the development of the Koninklijke Paketvaart Maatschappij (KPM), a monopolistic package boat service, which contributed to the political integration of the Netherlands Indies archipelago. The same argument, including land transport, was made more pointedly by Howard Dick (1996).

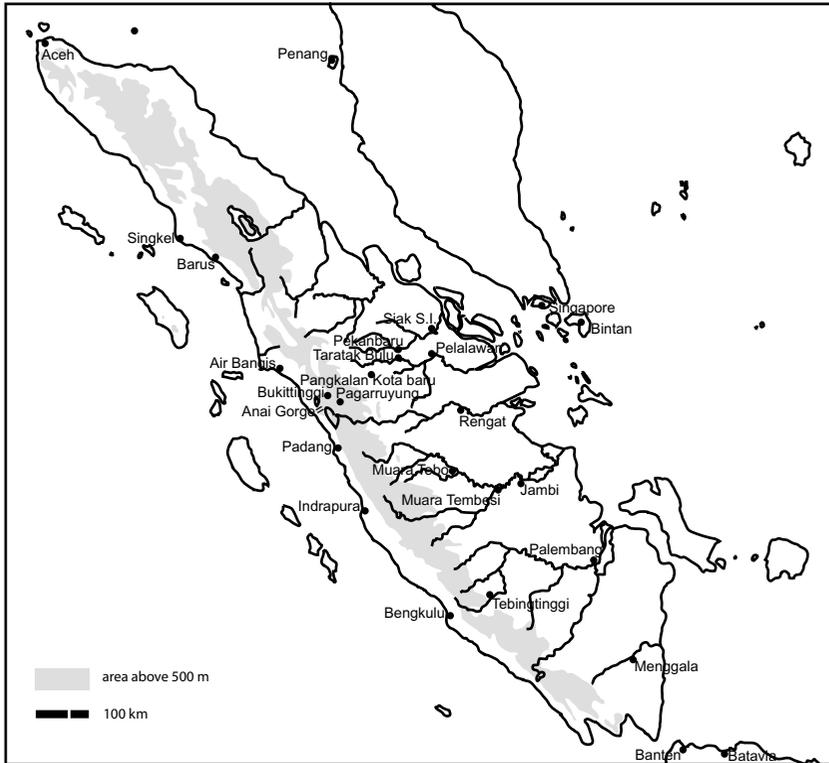
⁴ The actual geographical layout of Sumatra is from northwest to southeast. In common parlance, however, one speaks of the north and south end of the island; the long sides are called the west and east coasts.



Map 1.

by the Semangko Fault Zone, which cleaves the whole range into an elevated western half and a lower eastern half. A number of volcanoes straddle the fault zone. Debris from erosion and volcanic eruptions has filled the highland valleys of the Semangko Fault Zone, creating a flat, and sometimes fertile, underground. The asymmetrical location of the Bukit Barisan and the dissimilar relief of the west and east half of Sumatra both have a profound impact on the hydrology. The high mountains on the western side of the Semangko Fault Zone form Sumatra's watershed. Short rivers run down the steep western slopes of the Bukit Barisan towards the Indian Ocean. To the east a number of long, wide rivers flow, emptying in the Straits of Malacca: the Rokan, the Siak, the Kampar, the Indragiri, the Batanghari, and the Musi (Van Bemmelen 1949: 21–5, 188–9; Wolfram-Seifert 1992: 73–6).

In 1600, the west coast was sparsely inhabited. Cultivation of pepper at the foot of the mountains developed in the seventeenth



Map 2.

century and a large number of small ports emerged. These port towns were controlled first by Aceh and Banten, two sultanates in respectively North Sumatra and West Java, and later, starting in the late seventeenth century, by Dutch and British trading companies (Map 2). In the highland valleys of the Semangko Fault Zone, wet rice (*sawah*) cultivation was the predominant economic activity, and these valleys had by far the highest population density. Gold washing was another important economic activity in the highlands. Politically, this area was divided into independent villages and leagues of villages. A Minangkabau kingdom with a triumvirate at its head had little more than symbolic relevance. Around 1800, coffee cultivation was introduced on the slopes around the valleys and became a great success. This development coincided with the rise of the so-called Padris, modernist Moslems, who subjugated and united parts of the highlands. The east coast consisted of peneplain and alluvial land with

a natural cover of lowland tropical rainforest and swamp forest. Means of existence were fishing, collection of non-timber forest products, and shifting cultivation. The peneplain was used for cattle husbandry, and, starting in the seventeenth century, pepper cultivation (Colombijn 2003; Dobbin 1983; Furukawa 1994: 14–15, 20, 46–54; Scholz 1988: 31–5, 46–7).

During the whole period under consideration Sumatra was integrated in international trade, which can be traced back to the first millennium C.E. Gold, non-timber forest products, pepper, coffee and a few other cash crops were exported, while clothes and rice were the main import products. Because of its supply of export products, and its strategic location between two important seaways, the Straits of Malacca and the Sunda Strait, Sumatra has always attracted travellers, such as Chinese, Indians, and Arabs. In the seventeenth century, Northern Europeans became regular visitors. During the second half of the seventeenth century, the Dutch trading company, the VOC, established factories in Padang, Jambi and Palembang, while the British did the same in Bengkulu (Map 2). In 1800, the VOC was transformed from a company to the Dutch colonial administration. After the Napoleonic Wars this administration acquired Bengkulu in a peace treaty negotiated at European diplomatic tables. In the first half of the nineteenth century the Dutch subjugated the Palembang sultanate, the biggest state on the east coast, and the Padris of the highland valleys. From that time on, the Dutch colonial state interfered in the lives of the Sumatrans on an unprecedented scale. They introduced a system of mandatory coffee cultivation, as well as of other cash crops, and brought about improvements in the road system by way of forced labour (Andaya 1992; Colombijn 2003; Dobbin 1983).

Means of Inland Transport

Basically there were five means of transporting goods on Sumatra: humans, packhorses, carts pulled by draught animals, boats, and rafts. Which of these means was used depended on the geographical conditions.

One way for people to transport goods was simply to carry them, usually with the help of some device. Male porters carried 25–30 kg, in addition to their own necessities, and could walk, in this manner, for about 30 km per day over flat ways (Van Hasselt 1882: 367; Raffles

1830: 362).⁵ On hilly or overgrown paths, the effective weight was, as we shall see, only one-fifth of this. Minangkabau porters lashed goods to a four-foot vertical plank fastened to their heads. Other Minangkabau men carried the goods on a little stool, *kulipeh*, placed alternately on the left and right shoulder and kept steady with one hand. A simple roll of dried grass or a rolled-up cloth also served to reduce the pressure on the body. In Jambi, Kerinci and Rejang goods were secured to a frame that was carried on the back with ribbons around the arms and forehead (Van Hasselt 1882: 367; Nahuijs 1827: 166; Raffles 1830: 345, 362). They walked over the hills this way, 'generally going a shuffling or ambling pace' (Marsden 1811: 320). H.G. Nahuijs (1827: 166–7) reported that both Minangkabau men and women carried small amounts on the rims of conical hats. The rim was one foot wide and protected the whole body from the sun and the rain. It is conceivable, though, that these giant hats were only used during the decades that the Muslim reformist Padris, who prescribed a proper dress code, ruled the Highlands (Dobbin 1983: 282).

Goods with a larger volume were carried with other means of transport. Horses were used in the Padang Highlands and on the west coast, in particular in open fields (Van Hasselt 1882: 367). According to Akira Oki (1986: 11), a horse carried one *pikul*, or about 62 kg, but Gusti Asnan (2002), citing an agent of the Nederlandsche Handelmaatschappij, believes that the load was 100–150 kg. Horses, and more often buffaloes or cows, were also used as draught animals for carts (*pedati*). Such a cart consisted of a rectangular wooden boot, fixed poles and a shelter made of leaves (Van Hasselt 1882: 368). Carts required a wider and more level road than packhorses and carriers and it is not clear in which period the first carts, and the concomitant roads, were made in Sumatra. In West Sumatra the maximum weight a two-wheel carriage was permitted was 395 kg; for a four-wheel cart this was 790 kg.⁶ According to Gusti Asnan (2002) the weight carried by a cart at the end of the nineteenth century was up to 600 kg.

⁵ See also Algemeen Verslag (AV) Sumatra's Westkust 1825, Arsip Nasional Republik Indonesia, Jakarta (ANRI), Sumatra's Westkust (SWK) 125-1; Verslag over Sumatra's Westkust by Pieter Merkus, 23-11-1839, ANRI, SWK 151-6; Andaya (1995: 547).

⁶ Reglement op het gebruik der transportwegen ter Sumatra's Westkust, *Staatsblad van Nederlandsch-Indië* 1857, no. 103. It is unknown to what extent drivers adhered to these maximum weights or whether they surpassed them, as is usually the case in our time.

The cart increased the capacity of transportation considerably, but still compared unfavourably with river craft. River craft probably antedated carts in Sumatra by millennia, because the conduits for the vessels, the rivers, were quite simply there. A rough distinction can be made between boats and rafts, used depending on whether or not the vessel could also sail upstream. The generic term for boat was *perahu*. *Perahu* could be anything ranging from a hollowed trunk (*sampan*), for local transport, to a larger planked boat with heightened boards (*bilungkang*), which offered space to twelve to twenty people. Other types of intermediate size were, for example, *pancalang*, *darip*, *jukung*, *cara linkis*, and *kakap*.⁷ The carrying capacity of the *perahu* was between 1.25 and 3.75 metric tons.⁸

Rafts (*rakit*) were made of bamboo with a bamboo or wooden superstructure. The smallest raft, also called *lanting*, had two oarsmen, while the biggest were steered by six to eight persons. The carrying capacity of a raft was between six and eight tons.⁹ There were also other means of transport bringing goods downstream (but not in the other direction). Coconuts were lashed together like rafts. Buffaloes were tied to floating frames, in which the animals had to swim with the current (Van Hasselt 1882: 369). Timber was also floated down. A small complication for ironwood (*unglen*), an important timber for houses in Palembang, was the fact that its specific gravity is greater than that of water. Therefore, ironwood logs were lashed between two logs of a light sort of wood before being floated down to the town.¹⁰

⁷ AV Palembang 1834 and 1835, ANRI, Palembang 62-2; AV Palembang 1853, ANRI, Palembang 63-5; Van Hasselt 1882: 368; Van Hasselt and Snelleman 1881: 66. The colonial civil servants rarely explain the types, either because of ignorance or because they assumed the types were commonly known. A *pancalang* was suited for passenger transport and had twenty oarsmen and 2 coxswains. A *bilungkang* was used for freight and had eight to ten men on board. A *jukung* was a swift vessel with six rowers, which was used for sending messages. AV Palembang 1856, ANRI, Palembang 63-7.

⁸ AV Palembang 1834 and 1835, ANRI, Palembang 62-2. Dividing the total volume of downstream trade by the number of boat arrivals in Palembang in 1855, Oki (1986: 36) concludes that the actual load per *perahu* was no more than 0.5 ton. Although Oki speaks of the actual load and not of the carrying capacity, as I do, I find the figure of 0.5 ton unbelievably low compared to the capacity of both *perahu* and *pedati*.

⁹ AV Palembang 1834 and 1835, ANRI, Palembang 62-2; AV Palembang 1853, ANRI, Palembang 63-5.

¹⁰ The biggest problem with the transportation of timber was on land. Hauling one single tree out of the forest required the work of two-hundred to three-hundred people (AV Palembang 1949, ANRI, Palembang 63-2). A tree was usually not transported from the spot where it was felled to the nearest waterway over a distance of more

Inland Transportation Routes

The analysis of routes starts in the highland valleys, because they formed the most densely populated part of Middle Sumatra and formed the beginning or end of many trade flows. The flat valleys of the Padang Highlands offered ample opportunity for easy transport on foot or horseback. Where possible (on Lake Maninjau and Lake Singkarak), goods were transhipped into boats. These boats could be small *perahu* with outriggers, or 10-metre long boats, called *ridu*, with oars and a small sail, which could carry twenty to thirty persons, more even than the biggest boats sailing on the rivers.¹¹ In the mountains surrounding the valleys, the roads followed the ridges, which tend to be more level than the hillsides. Moreover the ridges have less vegetation that obstructs passage (Van Hasselt and Snelleman 1881: 40, 135, 220, 321; Müller 1837: 17).

Available evidence suggests that the road network in the highlands was fully-fledged and well established from at least the seventeenth century on. Christine Dobbin (1983: 68) mentions that Minangkabau political authorities, presumably village heads, kept the roads in Tanahdatar in reasonable repair with overnight resting-places. In 1684 Thomas Dias (or Diaz) reports the movement of thousands of troops, which, I believe, can only have taken place over roads.¹² Dias is the only VOC servant who, hiking up through the forests from the east coast, allegedly reached the Minangkabau capital Pagarruyung, though whether he really ever saw the highlands must be doubted. There are no European witnesses confirming that he actually reached Pagarruyung. At the time of his daring voyage, Dias was subject to criticism from his superiors and was in need of a spectacular accomplishment; his good contacts with Minangkabau must have enabled him to fabricate a credible travel story.¹³ In

than one cable length, or approximately 200 m (Generale Missive (GM) 31-12-1769, Algemeen Rijksarchief, Den Haag (ARA), Verenigde Oostindische Compagnie (VOC) 3251, f. 801r.).

¹¹ Kort rapport van het lid der Natuurkundige Commissie P. van Oort 16-8-1833, ANRI, SWK 148-2.

¹² Translaat rapport Thomas Dias over zijn reis naar Siak, 18-11-1684, ARA, VOC 1407, f. 3017-3029. Dias also mentioned a total of 3,550 traders in the sites he passed on his route from Siak, on the west coast, to the Minangkabau capital; these traders must have had an infrastructure of roads at their disposal as well. De Haan (1897) published Dias' report.

¹³ GM 31-5-1684 in: *Generale* 4 (1971) 691; Memorie voor Jesaia Schaap, ARA, VOC 1683, f. 870-871.

any case, Dias suggests a well-established road system convincingly, either from hearsay or from personal observation. Another VOC servant, Thomas da Lima, observed a reasonable road near Sungai Pagu, in the mountains on the west side of the island (behind Sepuluhbuahtandar).¹⁴

A qualitative change came with the advent of the supra-village political organization of the Padris. The Padris maintained roads and bridges in the highlands in good state for commercial purposes, as the Dutch discovered on entering the valley of L Koto for the first time (Aanmerkingen 1836: 216). One of the first Dutch travellers in the Padang Highlands, H.G. Nahuijs, noted with surprise the frequently excellent state of the roads, but the Dutch colonial presence may have made an impact by that time (Nahuijs 1827: 155, 158, 167, 171, 174).

The trajectories over roads and lakes in the Padang Highlands, as well as the roads through the longitudinal Semangko Fault to valleys north and south of the central Minangkabau valleys, were convenient, but they did not contribute to an economic specialization per ecological zone as they all lay within the mountains. Of more importance were the routes leading out of the mountains, of which there were two. The first option was the long, but comparatively easy way down the big rivers to the east coast and the Straits of Malacca. The second option was the short, arduous land route over the watershed of the Bukit Barisan to the west coast. During times when no political upheavals in Sumatra or the Straits of Malacca disturbed the peace and safety, the Minangkabau preferred the route to the east coast (Dobbin 1983: 4-5, 61; Kielstra 1889: 248). This preference would change with the development of the road network in West Sumatra under Dutch colonial rule in the nineteenth century.

For the route to the east coast, the Highlanders had to carry their goods a short way to the highest navigable points on the river. From there, goods were brought down on rafts and in boats. The technical difficulties of this outlet from the highlands will be discussed first, after which the alternative rivers will be compared with each other.

The first part of the route to the east coast, over footpaths through the eastern mountains and the piedmont zone, was the hardest. A trading party consisted of eight to ten men, two of whom carried about half a *pikul* of coffee each, while the others all shouldered provisions

¹⁴ Dagregister Thomas da Lima op zijn reis naar Songij Pagou, 17-6-1681 to 25-8-1681, ARA, VOC 1369, f. 1155v.

for the journey (Dobbin 1983: 104).¹⁵ In other words, ten men were necessary for the transport of 1 *pikul* (62 kg) of trade goods, an effective weight equal to the burden of a packhorse. In the forest, however, the tree roots clearly made horses not beasts of burden but rather useless burdens themselves. Roots, thorny shrubs, leeches, and elephant-made potholes could make the paths vexing experiences for humans as well. Elephants like to take the paths made by humans (Van Hasselt and Snelleman 1881: 65, 188, 332; Müller and Horner 1855: 130). In the rainy season, the paths were virtually impassable. The paths were ruined by buffaloes, which were driven over them in herds to be sold in towns. Sometimes villagers placed gates on the path, which, while easily passed by humans, forced the animals to make a detour (Van Hasselt & Snelleman 1881: 164, 188). Rivers were crossed over rattan suspension bridges. A spectacular 368-foot suspension bridge spanned the Musi River near Tebingtinggi.¹⁶ In the seventeenth century, in addition to the natural obstacles, Minangkabau traders established toll gates by placing a rattan across a footpath, demanding money from passing Chinese and Javanese traders (Andaya 1993a: 94).

Once the goods had reached the rivers, transportation became less onerous, because the flow of the water did most of the work. On the way to the estuary, goods were frequently transferred from one boat to another for two reasons. Firstly, navigation was sometimes interrupted by natural obstacles and luggage and goods had to be hauled overland. Secondly, it was economical to combine goods from small boats into one larger vessel, as soon as the depth of the river allowed this. Trade centres developed at points for transshipment: at confluences of rivers, at junctions of rivers and forest paths, and at the upper limits for certain types of ships requiring a specific depth (Dobbin 1983: 6; Müller 1837: 28–33; Oki 1986: 12). The river transportation system served as an outlet not only for the mountains, but also for the lower-lying ecological zones. For instance, in 1855, 28,000 boats and rafts drifted down the Musi to Palembang; four-fifths came from the peneplain and only one-fifth from the piedmont zone. Another 4,000

¹⁵ This information contradicts the aforementioned observation by Van Hasselt and Raffles that porters carried their own necessities. I believe that this discrepancy must be explained by the fact that Van Hasselt and Raffles observed porters in a densely populated area, where the porters could replenish their provisions every day.

¹⁶ AV Palembang 1856, ANRI, Palembang 63-7; see also AV Palembang 1852, ANRI, Palembang 63-4.

small vessels sailed up the Musi from the coastal zone. On average almost 90 vessels reached Palembang each day.¹⁷

The points for transshipment formed a three-layer hierarchy of collector and distribution points, reflected in Bronson's dendritic model. The term *pangkalan* stood for a landing place at the riverside in the piedmont zone, where footpaths conjoined the higher reaches of the rivers. In order to embark or disembark at a *pangkalan*, one usually had to descend or ascend a ladder leaning against the high riverbank. The toponyms of many upriver sites included the word *pangkalan*; one example is Pangkalan Kota Baru, which was, in 1834, a town of only fifty houses on the Kampar (Collet 1925: 279; Dobbin 1983: 104; Müller 1837: 31–3; Oki 1986: 12, 36–38). Starting with the *pangkalan*, the upper rivers served as feeder routes for the ports at the confluences. The toponyms of these ports usually combined the word *muara* (mouth) with the name of the smaller river that emptied into the main stream. For instance, travelling down the Batanghari from piedmont to alluvial plain, one passes Muara Tebo, Muara Tembesi and Muara Kumpeh. The downstream river ports, finally, functioned simultaneously as collector points for a whole river system and as seaports for ocean-going vessels (Bronson 1977; Reid 1993: 54). Chinese junks and VOC ships sailed up the river to these seaports in the seventeenth century, while steamships did the same in the nineteenth century. Empirical reality was, of course, more complex than the analytical three-tiered hierarchy might imply. Palembang, for instance, combined functions of *pangkalan*, confluence of rivers, and seaport.

The river ports were not located on the coast, but about 100 km inland, respectively: Patapahan, Pekanbaru, and Siak Sri Indrapura on the Siak; Pelalawan on the Kampar; Rengat on the Indragiri; Tanahpilih (Jambi) on the Batanghari; Palembang on the Musi; and, farther south, in Lampung, Menggala on the Tulangbawang. All of these ports were located higher than the alluvial coastal land, at a point where the soil became more solid. Moreover, at such a point of the river, all confluences had emptied in the main stream, but the delta had not yet branched off, which meant that all river traffic could be controlled from one spot (Colombijn 2003). Finally, the distance from the sea provided protection against overseas attacks, especially as defence works were erected along the river (Goudie 1989: 151, 177; Woelders 1975: 245, 265).

¹⁷ Politiek verslag (PV) Palembang 1855, ANRI, Palembang 61.

One type of obstacles to navigation consisted of those impediments created by humans. During disputes between the Jambinese downstream king and the upstream Minangkabau people, a rattan was stretched across the river to block all traffic.¹⁸ It is unclear whether the rattan effectively sealed off the river, or whether it was merely a traffic sign. Likewise, in 1731 and 1762, the Minangkabau king, cooperating with the VOC on the west coast, promised to close off the route from the highlands to Patapahan on the Siak, in order to redirect trade towards Padang;¹⁹ whether or not he was able to implement this promise is unknown. In the 1860s the sultan of Siak agreed with traders coming from the interior to hang a rattan across the River Kampar, to block traffic to his rival, the ruler of Kampar.²⁰ It is not known whether, during a smallpox or cholera epidemic, a rattan or rope would be hung across the mouth of a river in order to prohibit sick people from ascending into yet uninfected areas, as was the custom on Borneo (Knapen 2001: 145). Rattan could also hinder upcoming transportation. For example, eight exceptionally thick rattan cords, strung one after the other, defended the River Siak from a Dutch naval attack.²¹

There were also various natural obstacles that could hinder the vessels. Tree trunks sometimes obstructed their passage (Cornelissen, Van Hasselt and Snelleman 1882: 24, 235), and natural groynes, so-called *arahan*, could form behind those trees. The water table was of great importance. By drifting on the high tide and waiting during ebb, ships could make it from the river mouth to the town of Jambi in five or six days, in the dry season.²² In the wet season, however, the current could be so strong that navigation became dangerous. In those cases, on both the Batanghari and the Musi, big ships were forced to put out a hawser of some hundred metres and winch their way up; this time-consuming procedure was repeated over and over (De Sturler 1843: 41; Wellan 1926: 349).²³ By the early eighteenth century, even small Dutch vessels were forced to use this method on the

¹⁸ Dagregister Batavia (DR) 19-10-1636, 15-11-1636, *Dagh-register 1636* (1899: 254, 281); GM 13-1-1644, *Generale 2* (1964: 231).

¹⁹ GM 2-2-1731, *Generale 9* (1988: 212); GM 31-12-1762, ARA, VOC 3031, f. 954r-v.

²⁰ PV Riau 1868, ANRI, Riau 59.

²¹ Rapport Kapitein J.J. Visboom over de expeditie naar Siak, 16-8-1761, ARA, VOC 3024, Malacca p. 76.

²² Letter J.P. Coen to Heren XVII 31-3-1616, *Coen* (1919: 177).

²³ See also Journal of a voyage [...] to Jambi, 11-9-1615 to 25-10-1615, *Letters 3* (1899: 165-6).

Batanghari, which led to extra coolie labour costs.²⁴ An increasingly unnavigable Batanghari may have been one reason, in addition to political causes, for Jambi's decline after 1700. As far as downstream rafts were concerned, traffic could be postponed for months, if the water stayed too low (Andaya 1993a: 49). On the other hand, a water level that was too high could make the voyage dangerous, causing an observer of river transport in Banten (West Java) to remark that 'the river eats more humans than the tiger'.²⁵

Considerable effort went into maintaining or upgrading the navigability of the rivers. The sultans of Palembang ordered the removal of dead trees and *arahan* from the Musi (De Sturler 1843: 45). As early as the seventeenth century, the rivalling Dutch and English companies joined forces to remove eight trunks that were obstructing a narrow passage, the Engte van Brandend Eyland, on the Batanghari (Dagregister Batavia (DR) 13-12-1663, *Dagh-register 1663* 1891: 682). In the penneplain, canals (*terusan*) were dug between rivers as shortcuts. One such canal is the Terusan Kilip, which connected the Komering and Ogan and was named after Raden Kilip who constructed it.²⁶ More canals were dug in colonial times, apparently not instigated by Dutch civil servants but at the initiative of the people. In 1863, a new *terusan* between Ogan and Komering cut the travelling time between the two main downstream towns on these rivers from twenty hours to just two-and-a-half. Two years later, another canal reduced the distance between Palembang and the capital of the Ogan Hilir district from 54 to 35 km.²⁷ It is interesting to note that certain people had an interest in preventing such short cuts. In the early eighteenth century, a canal of 3.5 metres width and of equal depth connected a branch of the Musi with the Tulangbawang in Lampung; its digging was allegedly the initiative of the local people themselves. The sultan of Banten, overlord of Lampung, feared that pepper would leak away to Palembang via this new outlet and attempted to disconnect the two rivers by felling trees over the waterway (GM 13-1-1713, *Generale 6* 1976: 907; GM 6-4-1736 and 2-4-1737, *Generale 9* 1988: 747, 812).

²⁴ GM 25-11-1708, *Generale 6* (1976: 542); see also GM 15-1-1711, *Generale 6* (1976: 715); GM 30-11-1719, *Generale 7* (1979: 423).

²⁵ 'de rivier meer menschen eet als de tijger', Memorie van Andries Tersies, July 1659, ARA, VOC 1229, f. 292r.

²⁶ Belangrijke aanmerkingen over de rivier Kommering van J.F. Swent, 1823, ANRI, Palembang 70-15.

²⁷ AV Palembang 1863, ANRI, Palembang 64-4; AV Palembang 1865, ANRI, Palembang 64-5.

Estimates for travelling time on the rivers vary from author to author; this variation was probably related to the fluctuating water level in the river (depending on the season, and also varying from year to year), the kind of vessel used, the weight of the cargo, and the exact point of departure and arrival. Even more important is the significant difference between the upward and downward travelling time. According to John Anderson's (1826: 390) informants, it took 15 to 30 days to ascend the Batanghari to the Minangkabau heartland, while the descent took only 10 days (this time probably included an overland route). Dutch colonial officials counted on 24 to 36 days to sail from Palembang to Tebingtinggi, and only 3 to 4 days to return; the figures for Lahat were respectively 12 to 18 days and 2 to 3 days.²⁸

The actual pattern described above varied from river to river in two important respects: the navigability of the river and the density of footpaths connecting the highlands with the upper reaches of the respective rivers. The navigability of the rivers varied, depending on the depth of the river and possible shoals obstructing a free entrance from the sea. The current deterred ships from entering the Rokan and Kampar (Marsden 1811: 357). The so-called *beno* or *bena* is a high wave that moves up the Kampar during rising tides. This spectacular phenomenon gave rise to several local ghost stories; a western observer compared it to a charge of the cavalry. It seems that the *beno* first occurred four or five centuries ago (Tideman 1935: 6; Westenek 1927: 37-46). The Siak was the deepest of the northern rivers, navigable for vessels of any size (Anderson 1826: 200, 210). The Batanghari was also fine, although shifting sandbanks required the pilots' full attention (Van Hasselt and Snelleman 1881: 220, 253). Once a ship was on it, the Musi was the most convenient waterway, but the mud bar at its mouth forced ships to wait for the tide to enter.²⁹

In the piedmont zone, the upper reaches of the rivers were connected by a tightly knit network of footpaths (Dobbin 1983: 104-5; Oki 1986: 12-22). The peneplain had few connecting footpaths, with one important exception: the short track between Taratak Bulu on the Kampar and Pekanbaru on the Siak. This connection allowed traders to combine the best of two rivers for a popular route: the upper Kampar

²⁸ AV Palembang 1834 and 1835, ANRI, Palembang 62-2; AV Palembang 1836, 1837 and 1838, ANRI, Palembang 62-4; AV Palembang 1851, ANRI, Palembang 63-3.

²⁹ De Sturler (1843: 41); see also Aantekeningen gehouden gedurende de commissie naar Riau en Palembang juni-december 1838, ANRI, Palembang 71-4.

between Pangkalan Kota Baru and Taratak Bulu, and the lower Siak between Pekanbaru and the open sea. It took only a day to walk from Taratak Bulu to Pekanbaru, but robbers made the route unsafe.³⁰ Because of the network of footpaths in the piedmont zone and the peneplain path between Kampar and Siak, the Minangkabau traders could choose which river to take as an outlet. This choice of outlets meant that, for the rulers in the ports near the river mouth, the opportunities to tax the highland traders coming down from their respective hinterlands were reduced. If the highlanders felt they were being squeezed in the downstream port, they would simply choose another river.³¹ For example, in the early 1860s, traders from one district in the interior, L Koto, agreed with the sultan of Siak to replace the River Kampar as outlet for their export by the River Siak. They hung a rattan across the Kampar at Taratak Bulu and forced all traders to go from there overland to the Siak. A strongman (*jago*) sent by the ruler of Kampar tried in vain to break the blockade by force, but the heads of L Koto, persuaded by presents and promises by the ruler of Kampar, cut the rattan voluntarily in 1868.³²

The Musi was something of an exception among the other rivers. It was too far away from West Sumatra to be frequented much by Minangkabau traders; other ethnic groups lived in the Musi's hinterland. A dense network of roads and paths existed between its unusual number of tributaries—Rawas, Lakitan, Klingi, Musi proper, Lematang, Enim, Ogan and Komerang, and the piedmont town of Tebingtinggi became an important regional centre where several roads came together. Tebingtinggi's importance was enhanced by the fact that two roads led from it to Bengkulu on the west coast, one through Ampatlawang and the other through Rejang.³³

³⁰ Nota over het rijk Siak Sri Indrapura, ANRI, Riau 58-2. See also: Müller (1837: 30) and Oki (1986: 13).

³¹ There was also one connection in the eastern alluvial zone, namely between the Batanghari and the Musi via the River Lalang (GM 27-12-1688, *Generale* 5 1975: 216; Cornelissen, Van Hasselt and Snelleman 1882: 204-6). As this route lay below the towns of Jambi and Palembang, it was merely an alternative to coastal navigation and had no impact on the relation between the two capitals and their respective hinterlands.

³² PV Riau 1865, ANRI, Riau 58-2; PV Riau 1868, ANRI, Riau 59.

³³ AV Palembang 1834 and 1835, ANRI, Palembang 62-2; AV Palembang 1846, ANRI, Palembang 62-9; Topografisch verslag van de weg die langs de Moesie door Ampat Lawang en Redjang naar Benkoelen leidt, 1839, ANRI, Palembang 71-7; *Journaal van de resident J.E. de Sturler naar de divisie Oeloe Moesie aangevangen op 17-6-1824*, Koninklijk Instituut voor Taal-, Land-en Volkenkunde, Leiden (KITLV), H243, pp. 130-4.

As a whole, this system lay somewhat isolated from the other rivers, although trade developed between the Tembesi (a tributary of the Batanghari) and the Rawas (a tributary of the Musi), leading to quite lively traffic in the 1860s (Andaya 1993b: 93; Andaya 1995: 546; Kathirithamby-Wells 1993: 85; Oki 1986: 19). The Musi's special geography was one reason why the Palembang sultans' hold over their subjects was much more secure than that of the rulers on other rivers (Colombijn 2003).

The other outlet from the mountain valleys, the route to the west coast, was very different from the trajectory to the east coast. The mountains west of the Semangko Fault were higher and steeper than the mountains to the east. For a long time, goods were simply carried, by men, across the watershed of the Bukit Barisan to the ports on the west coast.³⁴ From at least the seventeenth century on, coolies were for hire to carry goods.³⁵ Caravans of gold-traders en route to the west coast consisted of a hundred or more men on foot (Dobbin 1983: 67). The two most important passes were the Anai Gorge (Lembah Anai, alt. 750 m) and the Subang Pass (alt. 1100 m), which were not necessarily popular, as they were easily controlled by rulers and robbers collecting levies. On his 1818 journey to the highlands, Raffles had to pay toll 26 times (Asnan 2002). The British paid fixed stipends to some villages so that the roads would be kept open.³⁶ There were many other trails leading over the mountains to the coast. These footpaths connected highland and coastal places that were ruled by the same clan, so that, in a way, the path was a physical realization of a kinship tie. At first, the paths were used by highlanders mining salt in the coastal saltpans. In the fifteenth century, they began to be used for international trade and acquired the name *jalan dagang* (trade roads) (Asnan 2002). In periods of heavy rain, the mountain paths became slippery and few people ventured crossing them.³⁷ On the west flank of the mountain range, the tracks often followed the bottom and banks of the rivers; although this meant that travellers had to clamber over rocks, at least the river bed was clear of vegetation (Raffles 1830:

³⁴ AV Sumatra's Westkust 1825, ANRI, SWK 125-1.

³⁵ Memorie van Overgave van Jacob Pits aan Melchior Hurt, Padang 18-12-1677, ARA, VOC 1330, f. 783.

³⁶ Letter Coles to Parr, 24-12-1805, India Office Records, London (IOR), Sumatra Factory Records (SFR) 108, p. 156.

³⁷ GM 28-1-1701, ARA, VOC 1630, f. 1085v.

318, 345, 361; Van Hasselt and Snelleman 1881: 156, 404).³⁸ The rivers themselves were navigable only in the western alluvial plain, sometimes for less than ten km. The navigability of the western rivers was further reduced by sandbanks impeding entrance from the sea. For instance, the entrance to the River Natal, with a medium sized port of the same name, was particularly dangerous, because the location of the sandbanks shifted. Ships of five feet depth could sail the river up to the market only, 15 minutes from the mouth.³⁹ In the mid-eighteenth century, the most important rivers for navigation were the Airbangis and the Tiku,⁴⁰ but their relevance paled in comparison with the eastern rivers. Most rivers in Bengkulu, south-west Sumatra, were also too shallow for navigation.⁴¹

As the crow flies, the route to the west coast was short, but it was also troublesome. According to De Stuers (1850: 148), it took porters ten to twelve days to get from the mountain valleys of the Padang Highlands to the west coast. When a port town developed into a collector point, as Tiku or Pariaman did in the seventeenth century, and Padang did later under the VOC, no network of tracks came together in that port. Completely in line with theories that would be formulated later by the geographer A. Lösch (Tolley and Turton 1995: 48–54), people preferred a detour that minimized the distance travelled overland, because sea transport was so much easier, hence cheaper. Consequently, they brought goods down to the beach in a straight line, and, from there, travelled further on coasters.⁴² A lively coastal trade ensued.

In addition to this coastal shipping, one long road followed the whole west coast through the alluvial plain, from Airbangis to Bengkulu. The road had to make only one inland detour immediately south of Padang, where the mountains reached all the way to the sea.

³⁸ For a seventeenth-century report about the use of riverbeds, see Dagregister Thomas da Lima op zijn reis naar Songij Pagou, 17-6-1681 to 25-8-1681, ARA, VOC 1369, f. 1154v–1155v.

³⁹ Nota betreffende Natal en Airbangis [1825], ANRI, SWK 151-3. See also: Müller and Horner 1855: 84.

⁴⁰ Ht van Bazel, *De Radicaale Beschrijving van Sumatra's West Cust*, 13-4-1761, KITLV, H167. Jacob Joriszn. One century earlier, the Padang and Terusan rivers were considered the best to sail on; Jacob Joriszn. *Pits, Beschrijvinge over de Westcust caerte*, 25 September 1672, ARA, VOC 1290.

⁴¹ AV Bengkulu 1872, ANRI Benkoelen 3-19.

⁴² It has been calculated that, for thirteenth-century Europe, transport costs were twenty times greater over land than over sea (Reid 1993: 53).

The condition of this road, and this can be said of all roads and paths, depended on the season. In 1680, the VOC servant Johannes Maurits van Happel and his Minangkabau companion travelled southward from Padang to Salida in three days, going first through the coastal mountains and then over the beach. They rode on horseback, but had to walk '*per pedes apostolorum*' where the path was too narrow, too steep or too slippery for the horses. The pair swam across the deep rivers. Salomon Vermeeren and fifteen VOC servants made the same trip in the reverse direction twelve years later. They started travelling after five rainless days, so that the river water never reached above their knees. In the valleys, where Van Happel and his comrade had toiled through swampy fields, Vermeeren and company rode over an easy road. They found the road in the mountains fairly good though neglected, overgrown with grass reaching 2.5 metres high. The road was probably temporarily under-utilized because of recent fights in the area. They too found some slopes dangerously steep.⁴³

From the above overview it is clear that there were several connections straight across Sumatra in existence. Several such connections existed between West Sumatra and Siak or Jambi. As early as the late seventeenth century, the Dutch knew about Tanjung, a lively *pangkalan* fifteen days' travel up the Batanghari from Jambi; from Tanjung routes led to various places on the west coast.⁴⁴ The British were also already sending letters from Palembang to Bengkulu in the seventeenth century (GM 28-2-1687, *Generale* 5 1975: 82). There were two different connections between Bengkulu and Palembang via Tebingtinggi. A British group made this crossing in twelve days (Raffles 1830: 321, 339). In 1748, a new path was cut to facilitate trade between Limun, in Palembang's hinterland, and Bengkulu (Andaya 1993a: 172), but no more was heard of it later. Yet another transversal connection went from Bengkulu via Kerinci to Jambi (Anderson 1826: 399).

⁴³ Relaa van de overlandreis van Padang naar Silida door Johannes Maurits van Happel, Salida 7-9-1680, ARA, VOC 1361, f. 117-122; Rapport van Salomon Vermeeren en Joannes Sas over hun landreis van Troussan naar Padang, Padang 19-12-1692, ARA, VOC 1518, f. 357v-365.

⁴⁴ GM 27-12-1688, *Generale* 5 1975: 215; for descriptions of later routes, see: Sumatra's Westkust Jaarlijksch verslag 1819-1827, ANRI, SWK 125-3.

Coastal Navigation

As far as the price per ton-kilometre was concerned, all inland transportation, including that on rivers, must have been more expensive than coastal sea-faring navigation, where it was possible to use bigger vessels. Bigger ships maintained coastal navigation along the west coast of Sumatra, with extensions to Banten, Batavia and places farther east on the north Java coast, and to Penang (after 1786), and Singapore (after 1819). From Aceh, Sibolga and Padang trade was maintained with the festoon of western islands off the Sumatran coast.

Traffic between mainland Sumatra and the eastern islands consisted of small vessels. Local traders carried goods in boats that depended only on paddles and the simplest of mat sails (Andaya and Andaya 1982: 18). This use of small boats goes against the rule of goods being transhipped in bigger boats as soon as the depth of the water allows it. This paradox may be explained by the fragmentation of settlements (ports of call) in the myriad of islands of the Riau Archipelago and the location of most of these settlements, namely somewhat inland on small creeks.⁴⁵ Another practical point is that contraband trade was carried on in *pukat* fishing boats (3–6 ton).⁴⁶ The technical requirements for fishing and smuggling (possibilities for a speedy escape) may have kept the boats swift but small. Or perhaps there were economic and political grounds that worked against the accumulation of capital necessary to build a bigger boat. These explanations do not necessarily rule each other out.

Anthony Reid (1997: 66) assesses that the average size of *perahu* sailing in the Malacca Straits would have been about ten tons. His estimate is remarkably accurate but a simplification. In reality, there was an enormous variation in the type and size of vessels (Table 1). This table is based on the 150 ships sailing from West Sumatra, Bengkulu, Jambi and Palembang to Batavia, of which both the type of vessel and the load (of pepper) were mentioned in the *Dagh-register*.

⁴⁵ The description of Bangka, in a letter by M.H. Court to T.S. Raffles, Muntok 20-7-1814, IOR, Java Factory Records (JFR) 41, third part pp. 13–17; AV Riau 1825, ANRI, Riau 60-1. The creeks were so efficient routes that when an ambitious Dutch civil servant constructed a road on the island of Bintan in 1826, it was afterwards called ‘one of the most ridiculous and most useless enterprises that can have been undertaken at any place’ (*een van de belachelikste en meest nutteloze ondernemingen die ooit op eenige plaats kunnen zijn daargesteld*). AV Riau 1827, ANRI, Riau 60-1.

⁴⁶ Letter M.H. Court to Henry St. George Tucker, Muntok 5-9-1814, IOR, JFR 41, third part pp. 57–8.

TABLE 1
Volume of Pepper Loaded on Several Types of Coastal Vessels

Type	n	min	max	mean	stdev	median	1-3 quartile
jung	57	3.4	123.5	23.8	24.8	15.4	10.2-24.7
giliang	37	0.9	18.5	7.5	4.5	7.4	3.7-9.9
tingan	21	0.7	11.1	6.7	3.0	7.4	5.6-8.3
balau	13	0.7	10.2	5.1	2.8	5.6	2.8-7.4
wangkang	7	6.2	49.4	20.4	14.9	13.6	12.4-24.7
lambu	7	4.6	14.8	8.8	3.8	7.4	6.4-11.1
konting	4	3.7	18.5	8.2	6.9	5.2	4.6-8.8
sampan	4	0.9	9.3	4.3	3.6	3.5	2.6-5.1

Source: *Dagh-register [1624-1648]* (1887-1903) passim.

Volume in metric tons (calculated from *pikul* valued at 61.75 kg).

The figures do not represent the ships' tonnage, but their actual load, including almost empty or overloaded ships. The weighted average is 14 tons. The widely disparate maximum and minimum values, and the high standard deviation suggest that the mean is not a good indicator of the normal ship loads. The median and the first and third quartile provide us with more information in this respect.

Coastal shipping depended on the prevailing winds, which changed with every monsoon. It was impossible to sail against the monsoon, even for the ocean-going VOC ships. In 1615, a Dutch ship battled for five months with an eastern wind off the west Sumatran coast, trying to make its passage through the Sunda Strait. It lost 163 sailors due to, ironically, lack of water.⁴⁷ Accordingly, coastal shipping was as dependent on seasonal changes of the weather as inland transportation.

Colonial Interference

The transportation system of Middle Sumatra was already dynamic before 1800: existing routes were maintained or improved, routes shifted due to political disturbances, and shortcuts were made. With the advent of Dutch colonial power in the nineteenth century, more changes came about, beginning in West Sumatra. The Dutch garrisons that subdued the Padris improved the roads of the highland valleys with compulsory labour, but in contrast to the Padris, they did this for

⁴⁷ Letter of J.P. Coen to Heren XVII 25-12-1615, *Coen* (1919: 150); for similar cases see: GM 22-12-1638, *Generale* I (1960: 731); GM 31-12-1647, *Generale* 2 (1964: 311).

military and not commercial reasons. Their wish to transport heavy artillery made roads imperative. Once the roads were in existence, they facilitated trade and stimulated the development of garrison towns to market towns. The commercial development of the garrison towns was further promoted by the military need for a number of artisans (Dobbin 1983: 136, 153).

After the main military objectives were fulfilled, colonial road construction in West Sumatra was dictated by economic needs. In 1833, Governor-General Johannes van den Bosch instigated a determined road-building programme in the Minangkabau area. Van den Bosch wanted to develop an export economy, centred on Padang and based on the booming coffee cultivation in Padang's hinterland. He had a road constructed from Padang through the Anai Gorge to the mountains, or the Padangse Bovenlanden (Padang Highlands) as the Dutch, from their perspective, called the mountains.⁴⁸ This road was the first one outside the valleys of the Bukit Barisan. It not only eased troop movements, but was also an important stimulus for coffee cultivation. Once the road was completed, in 1841, transport to the west coast became much more attractive and goods were brought down in bulk by *pedati*. Compared to porters, the carts cut the transportation costs (per ton-kilometre) by half.⁴⁹ In the peak year 1864, 21,223 carts came down through the Anai Gorge, which amounts to 58 per day on average, but about 10,000 ox-carts per year seems to be closer to the average annual number.⁵⁰ Van den Bosch's policy had consequences for transport throughout Middle Sumatra, for he also erected fortresses that cut off trade via the eastern rivers to Singapore (Dobbin 1983: 197, 218; Kielstra 1889: 235–237; De Stuers 1850: 68, 140, 175–6). By the mid-nineteenth century Padang was the only Sumatran port classed A in the Dutch colonial ranking system, equal to Batavia (Jakarta) and Surabaya (Asnan 2002).

At first, the road through the Anai Gorge continued from the lower end on to Pariaman, the shortest route to the coast, from where coffee was shipped to Padang. Later, a direct overland connection with Padang was established, which was only economical because

⁴⁸ As early as the 1820s, Dutch civil servants had worked on a road from Padang to Kayutanam, at the lower end of the Anai Gorge. Sumatra's Westkust, Jaarlijksch verslag 1819–1827, ANRI, SWK 125-3.

⁴⁹ AV Sumatra's Westkust 1852, ANRI, SWK 126-6.

⁵⁰ AV Padangsche Bovenlanden 1864, ANRI, SWK 127-21; AV Padangsche Bovenlanden 1868, ANRI, SWK 128-7; AV Sumatra's Westkust 1871, ANRI, SWK 128-14.

of the excellent quality of this road by contemporary standards. By the middle of the century, five other roads passable for *pedati* from the mountain zone to the west coast were ready, ending at Sibolga, Natal, Airbangis, Tiku and Painan.⁵¹ A seventh road to the mountains, intended to create a direct connection between Padang and XIII Koto via the Subang Pass, was started in 1861, but progress was hampered by repeated landslides. A satisfying trajectory was searched for by trial and error, but by 1870 this road had still not been completed.⁵²

The new roads formed only the hardware of transportation, and by trial and error the colonial administration searched for an adequate management of the means of coffee. During the years 1825–1830 and 1834–1841 the so-called Transport Etablissement (State Transportation Service) took care of the coffee. At the end of the first period it was decided that it would be more economical, from the treasury's perspective, to have the coffee brought down to Padang on men's backs using unpaid compulsory labour. The Minangkabau population detested this *corvée* strongly. In 1833, Van den Bosch, who preferred to have the local people cultivate coffee rather than carry it, decided to employ debt-slaves from the island of Nias for the transport of coffee. In 1839, a reported number of 956 coolies were employed by the Transport Etablissement, but they cost 60 percent more, per ton-kilometre, than local, private coolies. The state therefore decided to farm out the coffee transportation to entrepreneurs (*transportaannemers*) who hired coolies on the free market. In this way, for example, a private entrepreneur hired a train of 300 porters to carry a particular shipload of coffee from XIII Koto down to Padang. At first, the private entrepreneurs complained that payment was too low for a viable business, and did not dare to invest in ox-carts. Later they hired private *pedati* owners. In 1850, one entrepreneur experimented with four-wheeled carts drawn by four bulls; they had a loading capacity of over 900 kg, but their limited manoeuvrability made them impracticable.⁵³ Many people were able

⁵¹ AV Sumatra's Westkust 1854, ANRI, SWK 126-11; see also Graves (1981: 66–7).

⁵² The section 'Wegen, rivieren en waterwerken' (Roads, rivers and waterworks) in the *Algemene Verslagen* (annual reports) of Sumatra's Westkust provides abundant details on road construction by the colonial regime.

⁵³ *Verslag over Sumatra's Westkust van Pieter Merkus, 23-11-1839*, ANRI, SWK 151-6; AV Sumatra's Westkust 1849, ANRI, SWK 125-9; AV Sumatra's Westkust 1850, ANRI, SWK 125-12; AV Sumatra's Westkust 1851, ANRI, SWK 125-13; AV Sumatra's Westkust 1862, ANRI, SWK 127-15; De Stuers II 1850: 66, 68, 136, 138. The calculation of costs per ton-kilometre by the Transport Etablissement is from Graves (1981: 55).

to make a living in the coffee transportation business. An 1844 survey estimated that at least 12,000 men were involved as carriers in the coffee trade to Pariaman alone. A journey back and forth took ten days, and the remaining part of the month was used for recuperation (Dobbin 1983: 108).

The Dutch not only constructed roads from the mountain zone to the coast, they also made vigorous efforts to elaborate and upgrade the road network in the Highlands, at which they had already tried their hand during the Padri war.⁵⁴ At first, road construction was undertaken by the local administration, but in 1853 it was decided that plans for new roads in West Sumatra had to first be authorized by the Governor-General, with the exception of roads leading to coffee gardens.⁵⁵ New roads were mapped out; old roads were broadened (to the standard width of 12.3 m), paved and moved to a more level contour line; fords and ferries were replaced by rattan or wooden bridges, and these were substituted in their turn with stone ones. Repair work was undertaken after every devastating flood. These works were drawn by civil servants, who seem to have done a remarkable job, despite recurrent designing mistakes. The main showpieces were the three-arc stone bridge over the River Selo and another bridge that spanned a total of 68 m. By the 1870s, an admirable network of roads was in place throughout the Padang Highlands (Veth 1882: 84). Facilitating services developed along the roads, foreshadowing modern gas stations: coffee houses and rest stations for *pedati* drivers, grass-cutters and water carriers for the draught animals (Graves 1981: 67). Traffic rules, prescribing how to use the roads while causing minimal wear, were proclaimed in 1857. For example, rims had to have iron bands, and carts were not supposed to follow old marks in places where the road was not surfaced.⁵⁶

In general, the roads were constructed using compulsory labour (*herendiensten*) and chained convicts (*kettinggangers*). Müller (1837: 5–7) observed hundreds of men working on a new road. Most civil servants

⁵⁴ See the various Algemene Verslagen (annual general reports); for some interesting details, see in particular AV Padangsche Bovenlanden 1852, ANRI, SWK 126-9; AV Sumatra's Westkust 1853, ANRI, SWK 126-10; AV Padangsche Bovenlanden 1860, ANRI SWK 127-10; AV Sumatra's Westkust 1863, ANRI, SWK 127-19.

⁵⁵ Besluit 2 May 1853, no. 7, *Staatsblad van Nederlandsch-Indië* 1853, no. 35.

⁵⁶ Reglement op het gebruik der transportwegen ter Sumatra's Westkust, *Staatsblad van Nederlandsch-Indië* 1857, no. 103. This rule was withdrawn in 1864 and task of drafting a new one placed in the hands of the governor of West Sumatra.

took care that road construction, and even urgent repair work, did not interfere with rice cultivation, and in the course of the nineteenth century they provided the summoned labourers with more tools and food. Nevertheless, where the population density was low, the burden of road maintenance was so heavy that the population moved to other areas to avoid the *corvée*. This happened, for instance, along the road from Mandailing to Natal, so that in 1854 the state decided to relieve the compulsory labourers on this specific trajectory and contracted wage labourers instead. The road through the Anai Gorge was maintained by wage labourers paid by a tax levied from all inhabitants of the Padang Highlands, the so-called *kloofgeld* ('gorge money'). Nevertheless, after a devastating flood (*banjir*) in 1872, in addition to the ordinary wage labourers, the state summoned thousands of *corvée* labourers, who each worked between 17 and 28 days, adding up to 137,400 working days in total, and eighty convicts, to restore the damage to the road through the Anai Gorge. The maintenance of the excellent roads in the *residentie* capital, Padang, was financed through a tax borne by non-indigenous urban residents from 1858 on; but in 1807 residents who owned a carriage were already being assessed incidentally.⁵⁷ In the more densely populated areas, where the *corvée* labour was spread over more people, civil servants noticed a certain popular enthusiasm. The people recognized the advantage of the good and occasionally excellent roads for trade (and not only in coffee), were willing to invest time in them, and sometimes asked the colonial state to organize the construction with *corvée* labour.⁵⁸ In 1836, at which time the road through the Anai Gorge was not finished, but already in a usable state, two thousand people were taking it daily (Dobbin 1983: 213).

On the east coast of Sumatra, there was less need for improvement of the transportation system. The rivers and their tributaries and countless rivulets formed adequate routes, as most transport of bulk

⁵⁷ AV Sumatra's Westkust 1855, ANRI, SWK 126-12; AV Sumatra's Westkust 1866, ANRI, SWK 128-2; AV Sumatra's Westkust 1872, ANRI, SWK 128-18; Letter Martin to William Grant, Fort Marlborough 10-2-1807, IOR, SFR 110, p. 212; see also Graves (1981: 56, 68-9). In the town of Palembang all families were demanded to contribute to the maintenance of roads and bridges in labour or money. The money was for the largest part used to buy materials and to hire coolies. The remainder of the money was used for the secret police, as bonus for underpaid but deserving indigenous civil servants, and for maintenance of indigenous public buildings. AV Palembang 1845, ANRI, Palembang 62-8.

⁵⁸ AV Padangsche Bovenlanden 1852, ANRI, SWK 126-9; AV Sumatra's Westkust 1859, ANRI, SWK 127-7; AV Padangsche Bovenlanden 1860, ANRI, SWK 127-9.

goods (rice, non-timber forest products, pepper, and coffee) went downstream, the fast and easy direction in river transport. The rafts, on which the goods were carried to Palembang, were usually sold in town to take on a second life as an urban dwelling. Fast travel going upwards was only important for state officials, armies, and the post. In the sultan's time (before 1825), there was a road from Palembang to the hinterland, which was made in good order whenever nobles wished to visit one of the districts.⁵⁹ Apparently, this road, or probably path, was not always used or usable.

Lacking the sacral legitimization of the sultans, the Dutch colonial overlords felt a more urgent need to make their power manifest in Palembang's hinterland through a military presence. Moreover, the Dutch made zealous, albeit usually fruitless, efforts at agricultural extension, introducing various innovations in Palembang's hinterland. For these two reasons, the colonial state had a far bigger interest in quick upstream communication than the sultans did, but faced enormous practical obstacles.

The borders of the River Musi near Palembang were too soft for a road and were inundated during annual flooding. Consequently, the colonial state built a road that began 39 km upstream of Palembang, at Lorok, and ended at the inland garrison and market town of Tebingtinggi. Slashing a better route through the jungle and maintaining the road in good shape required incessant effort. Without constant maintenance the road would quickly become overgrown with plants and easily damaged by floods and elephants. Not surprisingly, the people hated the work on the roads and wooden milestones were sometimes cut down with *klewang* (sabres), in typical angry acts of 'everyday resistance' (Scott 1985).⁶⁰ Compulsory road construction weighed more heavily on the population in Palembang's hinterland than in West Sumatra, because of the low population density. Moreover, the sparse population lived along the rivers at some distance from the roads projected to make shortcuts from bends in the river, so that it took them longer to reach the working place. It is interesting that the famous naturalist Alfred Russell Wallace, who visited Palembang in the wet season of 1861–1862, found the road in a

⁵⁹ Memorie van Overgave J.A.W. van Ophuijsen, 17-12-1862, ANRI, Palembang 72-5.

⁶⁰ See, for instance: AV Palembang 1839–1841, ANRI, Palembang 62-6; AV Palembang 1844, ANRI, Palembang 62-7; AV Palembang 1860, ANRI, Palembang 63-11.

more than adequate state. There were stations at regular intervals of 16–19 km, where carriers (inhabitants of surrounding villages taking their coolie service, *herendienst*), were for hire at fixed rates (Wallace 1869: 134). This situation, however, was exceptional. The intensified road maintenance and coolie system had been instigated in 1861 and called off the very next year, because it kept people from agricultural work. Whole villages were deserting the River Musi to escape this burden.⁶¹

The colonial civil servants had more enduring success with the elaboration of existing footpaths into roads in Palembang's piedmont zone. There was a constant struggle against decay here as well, but, following extant paths, these roads at least met something of a popularly felt need. Population density was higher, and the construction work was borne by more people. In general, the roads in the piedmont zone were quite nice and the state carried its own goods around in ox-carts. The piedmont roads were lined with bamboo, which provided shade and kept weeds away from the road. At places, the road could be as wide as six metres; sometimes it had gutters (Cornelissen, Van Hasselt and Snelleman 1882: 54, 102, 136, 140). In the 1860s, the Dutch required the Rejang to build a road to close the connection between the upper Musi and Bengkulu. The construction was not only intended as a connection, but also as a sign of Dutch power (Galizia 1995: 39). A breakthrough was the road to Bengkulu, which enabled the transportation of agricultural produce in bulk from the mountains to the west coast. The scale of traffic was, however, much smaller than at the latitude of Padang.

With the exception of the way to Bengkulu, the roads in Palembang's piedmont zone did nothing to stimulate the exchange of goods produced in different ecological zones, and hence changed little in the exploitation of natural resources. The local Sumatrans continued to carry goods over the shortest distance to a river, preferring waterways from there. A potent reason to avoid the roads was the danger of tigers. What is more, the state prohibited private ox-carts on these roads and as such they were practically empty.⁶² From an economic point of view, the old established practice of upgrading the waterways was far

⁶¹ Memorie van Overgave J.A.W. van Ophuijsen, 17-12-1862, ANRI, Palembang 72-5.

⁶² AV Palembang 1839–1841, ANRI, Palembang 62-6; AV Palembang 1860, ANRI, Palembang 63-11; see also: Cornelissen, Van Hasselt and Snelleman 1882: 39, 54, 138; De Sturler 1843: 37.

more important. The state leadership was instrumental in stepping up efforts to clear the rivers of dead trees and to cut overhanging branches of trees.⁶³

In 1873 the colonial government made a modest beginning of road construction in Siak. A new route was chosen between Taratak Bulu and Pekanbaru to connect the Kampar and Siak. Perhaps in order to avoid the resistance against compulsory coolie services found in Palembang's hinterland, the colonial government left the construction of this road to the private market completely. An Arab and Chinese entrepreneur agreed to construct the road in three years in return for the untaxed sale of salt.⁶⁴

The dependence on the prevailing winds for coastal shipping was ended by the advent of steam power, but this came too late to make much difference in the period under consideration here. A direct line between Padang and Batavia was opened in 1850, and in 1866 Palembang came to have a regular steamship service, connecting the port twice a month with Batavia and Singapore. In 1868, the *Nederlandsch-Indische Stoomvaartmaatschappij* opened a line from Padang to the northern ports and Nias.⁶⁵ In 1862, a little steamer began to explore the possibility of a regular steamer service up and down the River Musi.⁶⁶ Colonial interference also covered communication. A telegram-cable was laid from Java to Lampung in 1866; it was extended to Palembang and Bengkulu, and, following the west coast, reached Padang in 1871 and Singkel in 1873.⁶⁷ At a time when every message had to be delivered in person, this cable was a great improvement in communications.

Transportation, Economic Specialization, and Ecological Change

In regions with many waterways, it is common for water transportation to be developed earlier and better than overland transportation. It

⁶³ See, for instance, AV Palembang 1852, ANRI, Palembang 63-4; AV Palembang 1856, ANRI, Palembang 63-7.

⁶⁴ PV Riau 1873, ANRI Riau 59.

⁶⁵ AV Sumatra's Westkust 1868, ANRI, SWK 128-6; Colombijn 1996: 389; Oki 1986: 22.

⁶⁶ AV Palembang 1862, ANRI, Palembang 64-1.

⁶⁷ AV Sumatra's Westkust 1870, ANRI, SWK 128-13; Gerdes Oosterbeek 1919: 477.

comes as no surprise that in Middle Sumatra as well people preferred waterways to roads wherever possible. What is surprising is that overland transport was also considerably elaborate by the seventeenth century at the latest. Even in the flat highland valleys and on the western alluvial coast, however, people did not travel as the crow flies but preferred a detour that enabled them to take a waterway as soon as possible, because the price of transport over water was so much lower.

The various means of transportation were each adequate for a particular ecological zone, or part of a zone: walking through dry river beds on the west coast; leading packhorses over the mountains; using ox-carts in the highland valleys; crossing Lake Singkarak by boat; walking over jungle paths to the eastern rivers' headwaters; and boarding boats and rafts of different sizes on the eastern rivers. There are many examples of precolonial rulers and ordinary people taking the initiative to upgrade roads and waterways.

The transportation network had a considerable impact on economic specialization of ecological zones.⁶⁸ It was not the product that determined the means of transport, as happens today; the available means of transport determined which goods were produced. Trees were only felled near rivers; deep in the forest only non-timber forest products with a very high value per unit weight were profitable, and the first bulk good, coffee, only became really significant after the construction of roads that were passable by carts.

The different ecological zones in Sumatra, each with their own opportunities, had the potential for economic specialization, but specialization is only feasible when the different ecological zones are to some extent integrated into one encompassing market. A prerequisite for regional economic integration is a transport network. Such a network existed at least as early as the seventeenth century. We can also invert the argument here, and state that a reasonably developed inland transportation network was probably in existence since the first millennium, as at that time Sumatra was already known

⁶⁸ Another kind of economic specialization, not further discussed here, is the rise of new occupations. I have already mentioned the *transportaannemer* and grasscutter. A person with another new job, who made his appearance after the introduction of *pedati* on the road to the west coast, was the agent who retailed coconut oil. Before *pedati* were allowed to bring oil in bulk form the coast to the interior, porters who returned from the coast to the interior brought coconut oil in hollow bamboo and sold it directly to buyers (Asnan 2002).

as an exporter of specialized non-timber forest products (Wolters 1967).

The colonial state constructed roads, first for military and administrative reasons, but later also out of economic motives. The attempt to build a road along the Musi went against contemporaneous common sense and the road was very expensive to construct and maintain. It did not change the transportation habits of the people in the Palembang hinterland and it played even less of an economic role than might have been possible, because the state did not permit private ox-carts to use the road. The extension and upgrading of the roads in the Minangkabau highland valleys strengthened the historical trend; these roads were welcomed by the people, but did not change the economic structure. However, the road from Padang through the Anai Gorge to the highlands fundamentally changed the transportation system in Middle Sumatra. By the mid-nineteenth century it had achieved such a good standard and was in such good shape that for the first time people preferred a direct overland connection between two places (the Anai Gorge's lower end and Padang) to a detour with a short overland section and a long, but easy water section.

The colonial development of the road network on the west coast also had several ecological effects. First, it facilitated the transport of coffee in bulk. The whole network was geared towards the stimulation of coffee cultivation: new roads were directed to the government coffee warehouses, and the existing roads were upgraded in order to make them passable for carts. Second, as was hoped by Van den Bosch, the improved transport freed hands to work in agriculture and boosted production.⁶⁹ Third, by reducing transportation costs, other cash crops with a lower value per weight unit than coffee became profitable and began to be exploited on a larger scale: cassia (a local sort of cinnamon); areca nuts; and gambier.⁷⁰ The fourth and direct effect was that plants and trees were removed for roads. Soil erosion on a recent unmetalled road has been estimated to be 11–13 tonnes per hectare per month, comparing unfavourably with the 0 tonnes in Indonesian primary forest (Durand 1993: 249); the frequent landslides aggravated erosion. Although the exact figures may have been different in the past, the mechanism of erosion starting where forest is felled for a road must surely have operated then as now.

⁶⁹ AV Sumatra's Westkust 1852, ANRI, SWK 126-6.

⁷⁰ AV Sumatra's Westkust 1851, ANRI, SWK 125-12.

Fifth and last, rice was brought in quickly to places where merchants heard food was in short supply (Kato 1980: 743), so that famines were mitigated.

Transportation and Political Centralization

The transportation system, together with the distribution and size of the population, has been called the format of a society. This 'societal format' has a considerable impact on the emergence of centralized polities (Claessen and Van de Velde 1987: 6). The mighty arm of the state does not reach farther than where the road ends. People who live relatively isolated enjoy a measure of immunity to state interference (Claessen 1995; Porath 2002). On Sumatra, political power lay in the ruler's ability to monopolize trade flows to a considerable extent. A monopoly awarded a ruler exclusive access to luxurious, prestigious import goods, with which he rewarded and placated subordinate, allied heads (Colombijn 2003; Wisseman Christie 1995: 249, 270, 277; Reid 1993: 202-4, 217, 219). The opportunities to monopolize trade flows are influenced by the number of alternative routes that have to be controlled and the distribution of settlements.

The relation between the location of transportation routes and the distribution of people, whether subjects of a state or not, is obvious. Nodes in transportation networks develop into settlements, and, conversely, towns and villages attract traffic. It is impossible to tell which is cause and which is effect in the mutual impact of transportation and settlement patterns. It is more accurate to state that the potential of the landscape for certain means of transport strongly influences the simultaneous development of both the actual transportation system and the settlement pattern.

There were roughly three different settlement patterns and concomitant transportation systems in mainland central Sumatra: a central place pattern in the mountain valleys; a dendritic pattern in the piedmont zone, peneplain, and alluvial plain of the east coast; and what I call a comb pattern on the west coast.

The flat valley floors in the Minangkabau Highlands with roads from every village leading in all directions approximated W. Christaller's central place system (Christaller 1933; see also Miksic 1984: 15-16, and Wolfram-Seifert 1992: 292-3). The settlement pattern consisted of many villages or strongholds (*koto*) spread out fairly evenly over the valleys. These places were united in leagues that bore the names

of the number of the constituent villages (for instance VII Koto, IX Koto, XII Koto, XIII Koto, L Koto). Rings of villages had a market, which took place in each village of that ring on a different day of the week. The markets in the seven principal villages around Lake Singkarak, which were visited by boat, are an example in this respect (Raffles 1830: 355). Some towns, for example Bukittinggi in the valley of Agam and Batusangkar in Tanahdatar, developed a daily market, where a larger range of goods and services were offered than in the smaller ambulant markets. These daily markets were the central places in Christaller's model and with a little leniency a hexagonal pattern of villages, compliant with Christaller's *Idealtipe*, might even be discernible. The daily markets emerged as central places only because of economies of scale, and there were too many alternative roads bypassing the central places to allow any market town to develop into a political centre monopolizing trade.⁷¹

On the east coast, the swampland of the peneplain and eastern alluvial zone impeded regular overland traffic, so that almost all transport was by river. The resultant hierarchy of collector and distribution points resulted in a 'dendritic' (tree-like) pattern of settlements for each river basin, with the roots on the coast and the branches pointing to the mountains (Bronson 1977: 43). An important facet of the dendritic pattern is that it left room for only one international seaport on each major river, situated above the point where the delta began, with too many exits to open sea to be patrolled successfully.⁷² There was no room for seaports other than the one on every riverine system, since any place on the coast between the rivers would be devoid of a hinterland and, from a practical point of view, would literally be situated on soft mud. Having more than one international port on a river was also inconceivable, because they would kill each other off, either keeping overseas traders from the upstream port or keeping hinterland traders from the downstream

⁷¹ There is insufficient detailed information about the valleys in the Semangko Fault Zone south of the Minangkabau area (Rejang, Lebong, Pasumah), to ascertain the existence of a central place system there too.

⁷² Two caveats must be made. First, now and then, a seaport could be eclipsed by another port slightly higher or lower on the river, as happened on the Siak (Oki 1986: 12–14), but the pattern of one dominant port per river would soon be restored. Secondly, some rivers had outports, populated by pilots, custom officers, and guards, together with fishermen. Examples are Sungsang on the Musi and Muara Kumpeh on the Batanghari. Neither of the caveats fundamentally alters the structure of the dendritic pattern.

port. The dendritic pattern allowed one, and only one, seaport with a ruler near the mouth of each river, from which point the ruler could control all traffic sailing up and down the river. The polities on the east coast were the most centralized of Middle Sumatra and of these states Palembang was the most stable, because the River Musi had the least alternative transport routes from the interior that bypassed the ruler at the river mouth (Colombijn 2003).

There was little natural differentiation on the west coast, and one place was as good as another for the establishment of a trading place. Therefore a large random number of small settlements sprang up, each with a small road leading to the interior. Ht van Bazel mentions as many as 39 coastal places between Barus and Indrapura, and farther south, in the direction of Bengkulu, still more places were found. The list includes names now almost forgotten, such as Ulakan, Bayang and Surantih.⁷³ Each place had a single route, path or river inland, and this route inland was as straight as possible because of the cost of travelling into the mountains. The result was a comb, with the coast as the back of the comb, with a tooth at each coastal town. This arrangement of a large but undetermined number of small towns arranged in one line is a clear contrast to the small, fixed number of ports on the east coast. With so many alternatives available, no single town or ruler could dominate others for a prolonged time, and political power was very fragmented (Colombijn 2003).⁷⁴

Transportation not only influenced the measure in which a central town could control trade in cash crops and luxurious prestige goods, but also set the maximum size of towns. Theory predicts that the size of a town depends on the size of its hinterland, which in turn depends on the efficiency of the transportation system. Food cannot be brought to towns if it takes more food to feed a porter than he can carry himself. In early modern times there was a clear upper limit to the maximum size a landlocked town could attain (Batten 1998). This insight helps

⁷³ Ht van Bazel, *De Radicaale Beschrijving van Sumatra's West Cust*, 13 April 1761, KITLV H167. Indrapura and some other places were not situated directly on the coast, but a little inland. For his survey, Van Bazel obviously made use of an older work: Jacob Jorisz. Pits, *Beschrijvinge over de Westcust caerte*, 25 September 1672, ARA, VOC 1290.

⁷⁴ The lack of political centralization did not prohibit a measure of cultural homogenization. Minangkabau custom (*adat*) spread from the highland valleys to the west coast and Islam entered the interior from the coast. Hence the Minangkabau saying: 'custom goes down, religion goes up' (*adat manurun, syarak mandaki*) (Asnan 2002).

explain why the towns in the mountain valleys had to remain small to medium sized, despite the plentiful rice fields surrounding them. Most towns on the west coast had to remain relatively small as well: their direct hinterland was meagre, the rice-rich highland valleys too far away, and overseas supply of food unreliable. The residents of British Bengkulu, for example, often faced starvation (Kathirithamby-Wells 1977: 131). Natal was vulnerable during VOC blockades, because the town had no rice-fields in its environs.⁷⁵ Palembang, on the other hand, was easily fed with supplies transported over the River Musi and was by far the largest town on Sumatra. Journeying on the River Musi, the traveller constantly encountered craft bringing daily necessities down to Palembang.⁷⁶ After it could be fed by *pedati* coming over the Anai Gorge road, Padang began to outgrow all other towns with the exception of Palembang.

The new road from the Minangkabau valleys to the west coast via the Anai Gorge, which had such a tremendous effect on economy, ecology, and urban size, also brought about a historical political caesura. For the first time, the comb pattern of transportation on the west coast was replaced by a system with one dominant city, Padang. What emerges is in fact a dendritic pattern, not of rivers, but of roads, rooted in Padang with the trunk road branching beyond the upper end of the Anai Gorge. From this perspective, Padang's rise in the nineteenth century, which is usually ascribed to Dutch military force and compulsory coffee deliveries, can also be understood in terms of transportation.

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⁷⁵ Memorie van Overgave van Sumatra's Westkust van Willem Maurits Bruijnink, 6-1-1737, ANRI, SWK 5-1.

⁷⁶ Journaal van de resident J.E. de Sturler naar de divisie Oeloe Moesie aangevangen op 17-6-1824, KITLV H243.

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